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September 23, 1999

By Hand Delivery
CALFED Bay-Delta Program
1416 Ninth Street, Suite 1155
Sacramento, CA 95814
Attention: Rick Breitenbach

RE: Draft Programmatic Environmental Impact State/Environmental Impact Report for the CALFED Bay-Delta Program ("Draft PEIS/R")

Dear Mr. Breitenbach:

This letter and attachments constitute Save San Francisco Bay Association's comments on the Draft Programmatic EIS/R for the CALFED Bay-Delta Program. Save The Bay is the oldest conservation organization in California dedicated to the protection and preservation of San Francisco Bay and the Delta Estuary and represents thousands of members. These comments have been submitted within the relevant deadline.

We were not able to address the entire document and technical appendices. However, we incorporate by reference all of the comments submitted by other members of the Environmental Water Caucus on aspects of the draft PEIS/R not directly addressed in these comments. In addition, because we did not receive responses to most of the comments that we submitted on the prior draft PEIS/R, we incorporate herein those prior comments by reference. A copy of our July 1, 1998 comment paper is enclosed as Attachment 1.

Thank you for your consideration of our views.

Sincerely,

Cynthia Koehler
Legal Director

enc.

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ATTACHMENTS

Comments of Save San Francisco Bay Association
CALFED – Bay Delta Programmatic Environmental Impact Statement
Environmental Impact Report

Prepared by: Cynthia Koehler, Legal Director

Save The Bay
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I. INTRODUCTION

Save The Bay continues to believe that the CALFED Program offers tremendous potential to solve the San Francisco Bay and Delta Estuary's many inter-connecting problems. It has at least two major advantages over similar planning efforts; it is asking the right questions and it has brought together the right parties.

For four decades, Save The Bay has been deeply committed to ensuring the ecological health of our region's ecosystem. Our Bay and Estuary contain an astonishing richness and diversity of economic and natural resources. These resources must not continue to be sacrificed in order to provide reliable water supplies for consumptive use around the State. Since filing our comments last July on the first draft PEIS (Attachment 1), we have renewed our commitment to work with the CALFED Program to identify options that lead to success and sustainability for all sectors of our economy and our ecosystem.

The new draft Programmatic EIS/R shows promise in several important areas. The Ecosystem Restoration Program and Strategic Plan have made important advances toward developing a restoration agenda that could take California beyond crisis management and continued species declines toward a healthy ecosystem. Some of the "soft path" methods for achieving water supply reliability have received greater attention and respect and at least some economic analysis has been initiated.

But the new draft is disappointing in two key respects. First, CALFED appears to be supporting a new round of subsidized water project development even as it is promoting alternatives that are far more economical and compatible with ecological health. Second, CALFED has developed almost no assurance mechanisms to support the ERP; and is lacking any proposal for long-term funding or water for the ERP.

Although its goals are correct, CALFED still has considerable distance to go to provide the public and decision makers with the information and analysis necessary to make rational decisions about the future direction of our Bay and Estuary.

II. OVERALL COMMENTS

A. Put the Bay Back in the Bay-Delta

The CALFED problem area should be redefined to include San Francisco Bay, or at the very least, the northern and central portions of the Bay. San Francisco Bay is inextricably linked to the Delta Estuary both biologically and hydrologically. The draft EIS/R fails to provide a scientific or policy rationale for arbitrarily excluding the Bay from the problem area of a "Bay-Delta" program. While we appreciate that the Bay is included in the "solution" area, there is little question that the problems facing the Bay that bear directly on the program objectives — and ecosystem quality in particular — are not addressed in the draft PEIS/R.

Recommendation: Revise the PEIS/R to include San Francisco Bay in the CALFED "problem scope" area.

B. The Revised Eight Program Elements

From its inception, the Bay-Delta Program focused on four co-equal program elements: ecosystem restoration, water supply reliability, water quality and delta levee integrity. One of CALFED's greatest strengths (as well as challenges) is that it is correctly attempting to address these problems comprehensively rather than in isolation from one another.

Last summer, CALFED proposed a major shift in these four program elements, expanding them from four to eight. The original four elements were renamed "program objectives." Three of these remain also "program elements," but water supply reliability is no longer a program element. In its place are four new program elements: water use efficiency, water transfers, storage and conveyance. Clearly these are all-important tools in obtaining the goal of water supply reliability. We objected at that time to this approach and have reiterated these objections since. (See Letter from Environmental Water Caucus {EWC} to Secy. Wheeler and Asst. Admin. Perciasepe, August 12, 1998, enclosed here as Attachment 2.)

However, the Phase II Report and the draft PEIS/R have elevated these tools to the same stature as the original program elements. This is not merely a semantic or bureaucratic distinction; it is a basic tenet of the Program that all "program elements" will proceed "in parity." It is reasonable and fair to expect parity in the ecosystem restoration and water supply reliability programs overall; it is very different to change these expectations and indicate that storage, for example, is in and of itself a program element on par with the ecosystem effort.

The effect of conflating program objectives with tools is that CALFED begins with what should be its conclusion; that additional new depletions of water from the ecosystem into storage reservoirs is appropriate and reasonable. However, the integrity of the water supply reliability program depends on addressing this question clearly and fairly. CALFED's decision to include new storage in its preferred alternative is not justified merely by its defining storage as a program "strategy" or "element."

Particularly troubling is CALFED's insistence — with little or no evidence or support — that new reservoirs are key to the environmental restoration program. Sprinkled throughout the draft PEIS/R is the assertion that storage can be used to "provide water for the environment at times when it is needed most." (See e.g., Phase II at 36, at 107.) This extraordinarily broad statement may be correct in a highly theoretical and abstract sense; however, the reality of reservoir construction and operation is squarely to the contrary.

Moreover, reliance on the notion that reservoirs are for the benefit of the ecosystem requires belief that further engineering and management of the system is the best remedy for the ailing Central Valley Basin as opposed to a return to natural processes and functions — a notion that appears to be squarely at odds with the basic premise of the ERP and Strategic Plan.

CALFED is correctly premised on the notion that data, information and science should govern decisions. The bald, unsupported notion that new water development can not only be made compatible with ecosystem recovery — but is ***actually necessary for it*** — is unsupported by the draft EIS/R. We have raised this concern on many occasions in the past. (See Letter from Environmental Water Caucus to Secy. Wheeler and Asst. Admin. Perciasepe, August 12, 1998, Attachment 2; see also Letter from 77 Statewide Environmental Organizations to Secy. Wheeler and Asst. Admin. Perciasepe, Oct. 15, 1998, enclosed as Attachment 3.)

> ***Recommendation: Revise the draft PEIS/R to clarify that storage and conveyance are tools that are on the table as part of an overall strategy to achieve improved water supply reliability, include the storage and conveyance "programs" under a water supply reliability program.***

C. New Commitments to Surface Storage in the Preferred Alternative

It has long been our view (shared by others in the environmental community) that it is reasonable to include new storage options in the NEPA/CEQA analysis. However, CALFED has steadily increased its commitment to constructing new reservoirs while failing to conduct or provide the basic economic or technical analysis demonstrating that such new reservoirs are either:

1) economically feasible when compared to the other water supply reliability options; or

2) environmentally feasible when analyzed in conjunction with the ambitious ecosystem restoration objectives of the program.

Specifically, the PEIS/R provides in numerous places that: *"New groundwater and or surface storage **will be developed and constructed**..."* (See, e.g., Phase II at 28.)

Thus, CALFED appears to have moved from "whether" squarely to "when, where and how." As discussed below (and in comments submitted by our EWC colleagues) the draft PESI/R fails to provide a substantial rationale or justification for making this leap. Mere assertions that "we are going to require all the water we can get" are not a substitute for analysis and evidence supporting the decision to construct new storage.

As indicated above, the great strength of the CALFED program is that it is intended to address restoration and supply questions together. The draft PEIS/R fails to live up to that promise where it dodges the central question of whether and how its ecosystem objectives can be reconciled with a program of new water development. We appreciate that CALFED expects such new development to have "multiple benefits." But as we and others have indicated in prior comments, and on numerous occasions in the CALFED process, the Bay-Delta Program has provided little or no evidence that new storage can be made compatible with restoration which relies in large part on increased instream uses of water, not less.

In expressing concern about the direction of the preferred alternative toward more storage development, we are in no way retreating from our commitment to increased and sustained water supply reliability. We appreciate that for many in the CALFED process, reliability has only a single meaning: new surface reservoirs. We respectfully disagree with this view; we and our EWC colleagues have demonstrated that building new reservoirs are probably the least effective way to achieve reliability. The critical issue for the Bay-Delta Program, however, is that it is obligated to provide full disclosure on these issues in its NEPA/CEQA documentation. It cannot rely on unsupported assumptions in making such a critical determination.

III. NEPA/CEQA ISSUES

A. Standards for a Programmatic EIS/R

The National Environmental Policy Act (NEPA), 42 U.S.C. 4371 et seq., and the California Environmental Quality Act (CEQA), Pub. Res. Code 21000 et seq., have similar requirements for programmatic environmental impact documents. PEIS/Rs have the same general purpose as site specific EIS/Rs; to inform the public and decision makers of a program's environmental consequences before decisions are made. A programmatic EIS/R must provide the basis for decision makers to determine whether subsequent actions may have significant environmental effects. It should address such effects specifically and comprehensively.

To the extent that the EIS/R omits relevant information, it precludes the informed decision making that is the point of NEPA and CEQA. For example, an EIS/R must contain enough information about each alternative to allow meaningful evaluation and comparison of impacts.

It is not sufficient for a programmatic EIS/R to merely provide general policy guidelines; it must ensure that decision makers consider all of the specific and particular consequences of their actions and the alternatives to them. Indeed, this standard is particularly crucial at the programmatic stage as subsequent EIS/Rs often rely heavily on the environmental analysis conducted at the first tier. CALFED may not defer analysis of key environmental impacts to the project specific stage. As the courts have found, "tiering is not a device for deferring identification of significant environmental impacts that adoption of a specific [alternative] can be expected to cause." *Stanislaus Natural Heritage Project v County of Stanislaus*, 48 Cal. App. 4th 182 (1996). The adequacy of the CALFED PEIS/R is all the more important because the agencies have indicated that they intend to use it as the project specific environmental review for at least part of the Program.

As discussed below, and in comments submitted by our comments in the EWC, the draft PEIS/R must be substantially revised to provide the public and decision makers with the information necessary to make sound decisions about the future of the CALFED Bay-Delta Program.

B. Range of Alternatives

The draft PEIS/R does not contain a reasonable range of alternatives. The document clearly states that all 8 elements (see above) are contained in all of the alternatives and they do not vary. (PEIS/R, ES-6) The only piece of the program that changes at all is how to convey water through the Delta. (PEIS/R, 2-1). Even these very limited alternatives are not set forth in a way that conveys clearly the differences between the options.

Most troubling is the decision not to put forth alternative approaches to the development of new water storage, or to clearly disclose the differences between a long-term program based on construction of new facilities and further depletions of water from the ecosystem as opposed to the programmatic alternative of relying primarily on the "soft path" outlined in the EWC Blueprint (see below).

We appreciate that the PEIS/R attempts to finesse this issue by asserting that "all tools" are required and therefore there really are no water supply reliability alternatives; there is just one program. In this manner, the programmatic document shirks one of its basic responsibilities which is to clearly set forth the costs and benefits (environmental and financial) of the suite of water supply options available. It may ultimately prove to be the case that "all tools" are required; it is not a case that the CALFED agencies have made in the draft PEIS/R.

Recommendation: Revise the PEIS/R to clearly identify water supply reliability alternatives and their respective environmental impacts.

C. Environmentally Superior Alternative

The draft PEIS/R summarily states that the preferred alternative is the environmentally preferable or superior one for purposes of NEPA and CEQA. ES-17. This is a self-serving statement that is not supported by any factual presentation, data or analysis in the EIS/R. It is simply stated to be the environmentally compatible alternative because it "meets the CALFED objectives." To the extent that the preferred alternative involves the construction of new water development facilities with severe environmental impacts, it fails to meet the legal definition of "environmentally superior or preferable" as those terms are used in NEPA and CEQA.

D. Evaluation of Environmental Impacts

CALFED has misconstrued the purpose of an EIS/EIR to a certain extent as indicated in its summary of consequences. Even a programmatic document is intended to inform decision makers about the ***environmental*** impacts of proposed actions. In light of the magnitude of the CALFED program, the summary of impacts is surprising in its limited discussion of potential environmental impacts, focusing more broadly on social, economic and other issues. This problem is not remedied in the larger impact analysis. While these issues must be examined in evaluating a program of this magnitude, the EIS/R cannot do its job if it does not fully and completely address the environmental consequences of the preferred alternative.

Illustrative of the inadequate analysis of environmental impacts is the draft's extraordinarily limited analysis of the environmental consequences to fish and aquatic species of the storage program. Less than three pages total is devoted to the one of the core conflicts in the Bay-Delta system.[1] Moreover, little actual information is provided. For the most part, the EIS/R continues to insist that new storage could benefit species. No supporting documentation or evidence is provided or cited. In place of impact analysis, the EIS/R informs that "actual effects will need to be determined for specific projects." (See 6.1-38.) Obviously this is true; but a programmatic document is required to provide programmatic information. "Programmatic" is not a synonym for "vague" or "uninformative."

[1] Delta Region discussion, 1 page (6.1-38-38); Bay Region, ½ page (6.1-42-43); Sacramento and San Joaquin River Regions, 1 page (6.1-47-48).

The draft PEIS/R fails to meet NEPA/CEQA standards for programmatic level impact analysis, particularly with regard to natural resource impacts of proposed CALFFED water management programs.

IV. WATER SUPPLY RELIABILITY

As indicated above, one of the principle failings of the draft PEIS/R and Phase II Report is that CALFED has diluted the focus on its water supply reliability program by breaking it into 4 program elements; transfers, water use efficiency, storage and conveyance.

We concur entirely that each of these strategies is properly part of a coherent Water Management Plan. But this Plan should have been included in the PEIS/R and these strategies should be addressed in connection with one another as part of a coherent whole. Instead, CALFED has separated them into somewhat isolated elements each with their own distinct objective and fails to demonstrate how they together will (or may not) achieve the important goal of water supply reliability for California's water users.

Almost a year ago, Save The Bay and our colleagues in the Environmental Water Caucus prepared a 45-page *"Blueprint For An Environmentally and Economically Sound CALFED Water Supply Reliability Program"*, enclosed as Attachment 4. This Blueprint makes a compelling case that reliability can be achieved reasonably and efficiently. While it is not intended to be a definitive treatment of this subject, it is an important beginning. The draft PEIS/R fails to address most of the questions raised in the Blueprint about CALFED's approach to water supply reliability and suffers substantially as a result.

> ***Recommendation: Revise the Phase II Report and PEIS/R to address water supply reliability comprehensively and not in the current piecemeal fashion and incorporate the recommendations contained in, or respond to, the EWC Blueprint.***

A. Continued Failure to Identify Water Supply Reliability Objectives

Save The Bay and our colleagues in the EWC have repeatedly criticized CALFED for applying a double standard to its program: The ERP is expected to have clear "performance objectives" so that all parties share a common understanding of the Program's goals and so that, as some have put, "the restoration program is not endless." However the water supply reliability program is remarkably free of similar specific, quantifiable goals, not only making its ultimate objectives amorphous, but also establishing an essentially unlimited goal for the development of new water supplies. This has caused considerable confusion about CALFED's mission with regard to this leg of its mandate and has given rise to the notion that CALFED should be dedicated to increasing the state's developed water supply. The long-standing tenet to the contrary, that CALFED was not intended to solve all of the State's water supply problems, appears to have been lost largely as a result of the refusal of the Program to establish clear objectives.

> ***Recommendation: Revise the draft PEIS/R to identify specific and measurable water supply reliability goals and objectives for the CALFED program. These objectives should not focus on achieving a particular level of supply, storage or transfer, but rather on improving reliability to ensure the maintenance of healthy agricultural and urban economies and communities.***

B. Timing of the Water Management Strategy

Save The Bay supports CALFED's decision to develop a Water Management Strategy. (Phase II Report at 53.) However, this document clearly should be part of the EIS/R. We appreciate the timing constraints that make it difficult to bring everything together in a single document.

Nevertheless, it is essential that the WMS receive as much scrutiny and public review as the rest of the EIS/R, particularly since many of our concerns and criticisms of the draft document (and others') flow from the failure of the draft to address the water management options comprehensively or to provide meaningful comparative information regarding cost, environmental impacts or ability of these options to increase reliability and satisfy demand.

> ***Recommendation: CALFED should treat the WMS as a part of the PEIS/R: it should circulate the WMS as broadly as the draft PEIS/R, provide a similar comment period and incorporate changes to the WMS in the next iteration of the PEIS/R.***

C. Integrated Storage Investigation

Save The Bay has previously submitted detailed comments on the ISI. We have never received a response to those comments and the issues identified therein have never been addressed or resolved. The draft EIS/R fails as well to either address or resolve these issues. (See Letter from Barry Nelson to Lester Snow, enclosed as Attachment 5 and incorporated in full here by reference.)

Of continuing particular concern, the draft PEIS/EIR and Revised Phase II Report treat the ISI — and the issue of storage generally — as a piece of work distinct from the rest of the Water Management Strategy. While it is indicated that the ISI will be included in the WMS, it is clear that the ISI is a separate product and, for example, will be used to determine the least environmentally damaging way to build new storage facilities.

(Phase II Report at 93.) This begs the question of whether new storage facilities can be justified at all in light of other water management options.

> ***Recommendation: Revise the EIS/R to incorporate each of the suggestions made in Attachment 5.***

D. Decision Making Re: Storage

CALFED's premature commitment to the development of new water storage projects is further manifested in its proposed decision making process.

1) The draft PEIS/R states that decisions about whether to proceed with **construction** of storage projects will be predicated on various linkages; this suggests that pre-construction decisions will

not be linked to progress in other program areas. (Phase II Report at 107.) This is a problem in that, as indicated above, by the time a project is ready for construction considerable project implementation has already occurred. Moreover, by that late date, the project is likely to have developed considerable momentum and expectations for its completion will be high.

> ***Recommendation: Revise PEIS/R to provide that decisions about whether to proceed with site specific implementation for water storage projects will be predicated on appropriate linkages. (See below.) Moreover, the PEIS/R should be revised to include specific linkages at important decision points for storage projects as there are any number of important "go" or "don't go" steps along the way.***

2) The "linkages" upon which decisions about water storage development projects will be based, as proposed in the Phase II Report, are inadequate. There are 4: completion of the ISI, "progress" in meeting the targets of the other water supply reliability program elements, "implementation" of groundwater programs and legal compliance.

This list does not establish key linkages to the rest of the program and is not satisfactory from legal or technical perspectives.[2] To the contrary, it basically provides that water storage projects will be constructed once the ISI is complete and the other WMS programs are underway.

We are alarmed that CALFED has apparently abandoned the notion that decisions to move forward with new storage should await hard evidence that such projects are necessary to achieve the water supply reliability goals of the program and, further, that such decisions should await financial commitments from beneficiaries.

> ***Recommendation: Revise PEIS/R to include the following program linkages as contingencies to proceeding with new storage projects. 1) Demonstrated need for such projects in order to meet the water supply reliability objectives of the CALFED program based on the progress of the water use efficiency, reclamation and water transfer and other WMS programs; 2) Binding commitments on the part of water project beneficiaries to repay the public financing for "studies" and to pay for project implementation; and 3) Demonstrated parity of progress in the ecosystem restoration program -- not in terms of dollars spent but in terms of attainment of the program's performance standards.***

[2] **The last bullet is required in any event and is not appropriately considered a CALFED "linkage."**

V. ENVIRONMENTAL WATER ACCOUNT

The Environmental Water Account concept is one of the more original and interesting developments to come out of the CALFED process. We concur with the Bay-Delta Program staff that the concept has important potential. However, the analysis of the EWA proposal in the draft EIS/EIR is insufficient in several important respects. The Phase II Report in particular is less an analysis and evaluation than an advertisement.

Save The Bay provided detailed comments to CALFED, at its request, last December when the EWA was first discussed in a Revised Phase II Report. We appreciate that the question of whether the EWA would be employed to replace the current regulatory standards has been clarified somewhat and that it seems to be CALFED's current position that the EWA would not serve as a substitute for the current standards and legal requirements but would provide water to the environment on top of such standards. (Phase II Report at 96.) However, the recent draft addresses only a few of the concerns that we previously articulated. Most critically, as indicated in our December 9, 1998 letter to Secretary Babbitt, significant institutional, operational and policy considerations crucial to the functioning of any EWA have not been addressed much less resolved. (See Letter to Hon. Bruce Babbitt from EWC Members, December 9, 1998, enclosed here as Attachment 6.)

A. EWA Description

The draft PEIS/R and Revised Phase II Report fail to provide a clear description of the EWA. It is claimed that the EWA "is a good example" of how to simultaneously protect fisheries and improve reliability and that it is "based on" various "concepts" and that the importance of a successful EWA program to CALFED "cannot be over-emphasized." (Phase II Report at 95.) None of this tells the public what an EWA is. Moreover its very purpose is unclear. Its name suggests a way of ensuring the availability of water for restoration purposes. However, other CALFED documents suggest it is for the more limited purpose of meeting ESA requirements "while achieving other [CALFED] program objectives for water supply and water quality." (Draft EIS/EIR Imp. Plan. at 80.)

Save The Bay fully supports existing endangered species laws and methods of complying with these laws that minimize impacts on water users. However, it is critical that the public and decision makers understand fully whether CALFED is proposing the EWA as a method to mitigate the impacts of current regulations on water users, or whether it is proposing the EWA as a method of securing the ***additional*** water that will be necessary to meet the ambitious restoration agenda of the ERP — which reaches far beyond mere compliance with existing regulatory requirements.

> ***Recommendation: The draft EIS/R should be revised to include a clear description of the EWA concept rather than simply promote it or provide examples of "how an EWA could work." It should clearly state that an EWA is essentially an accounting mechanism for keeping track of water that "belongs" to the environment and that the concept, at least as currently envisioned by CALFED, relies on the acquisition of new supplies.***

B. Continuing Unresolved EWA Issues

We appreciate that several of the issues Save The Bay has raised over the last nine months are identified in the Phase II Report. Nevertheless, the list presented is not adequate and fails to inform decision makers and the public of the large number, and importance, of non-operational issues that are critical to ascertaining the very viability of an EWA. Without such resolution, it is not at all clear that the EWA can serve the important function envisioned by the draft PEIS/R. These issues include but are not necessarily limited to the following:

1. Because the current water quality and other environmental protections now in place were developed with the best protection of the species in mind, there are questions as to how much actual room for operational flexibility there may be that would not result in adverse biological impacts. The draft PEIS/R appears to assume that there is substantial margin for increased flexibility without resulting in adverse impacts. This assumption needs to be supported with specific data and analysis.

2. The draft strongly indicates that the EWA will "work best" if additional water storage is developed, but provides no guidance to the public or decision makers as to the range of new water under consideration. This should be clearly disclosed.

3. If analysis reveals that additional storage would be beneficial for purposes of an Environmental Water Account, how much and what type of storage is appropriate? CALFED must also ascertain whether the potential adverse impacts of developing more storage — and depleting more water from the natural system — could undermine the potential benefits of increased system flexibility.

4. If additional new storage is determined to be an essential element of an Environmental Water Account, the question of whether and how the environment would share in the use of existing and new facilities — for both storage and conveyance — must be addressed and resolved.

5. The draft fails to evaluate, or even identify; the issue of carryover of ecosystem credits from year to year. CALFED must also examine other potential uses of ecosystem water (and financial) credits.

6. The effectiveness of the EWA depends largely on the EWA manager. Whether or not an institutional structure and controls can be developed to ensure that the ecosystem manager is capable of providing an appropriate level of environmental assurance remains an open question. The draft provides virtually no information on this matter -- indeed, it fails even to identify which agency would manage the EWA, the water project operators or the ecosystem managers.

7. The EWA concept assumes a clear and agreed upon starting point in terms of the water available to the environment. This "baseline" question is remains contested among the parties to CALFED and the draft PEIS/R does not appear to propose a resolution, in the EWA section or elsewhere. The EWA proposal cannot go forward unless and until the baseline assumptions are fully disclosed to the public and decision-makers.

8. Assuming that the baseline issue can be resolved, a critical next question is whether the environment receive an initial "endowment" of water over and above that which it is entitled to based on current statutory and regulatory standards alone? The EWA proposal fails to consider this possibility. This omission should be corrected and the EIS/R should be revised to include a full discussion of this option.

9. Essential to the success of an accounting system for environmental water are clear understandings about how that water is to be used through the system and some mechanism(s) for ensuring that such water is used consistently with those understandings. For example, the draft EIS/R does not address the issue of "reuse"; under what circumstances can water that is part of the EWA be recaptured by downstream diverters, if any?

10. Nor does the draft explore mechanisms necessary to provide EWA "assets" the same security as other water in the system. The draft EIS/R should be revised to explore such mechanisms including, at a minimum; (1) the benefit of establishing a system of instream water rights (now not available in California); (2)

11. A plan addressing the issue of secured debt and delayed payback of Account water should be developed.

12. Strangely, the draft PEIS/R never discloses how CALFED plans to keep track of, or account for, water that is used by, or owed to, the environment with certainty. Obviously, this is critical if the EWA is to be more than a concept or theory. We know from the seven year controversy over the CVPIA's mandate to establish a kind of mini-EWA that accounting for water for the environment, as opposed to water that is diverted for consumption, is extremely complex. The draft EIS/R should be revised to fully disclose alternative accounting systems for the EWA.

13. What should be the appropriate assumptions about the extent to which water user assets grow in relation to those of an Environmental Water Account? What accommodation should be made for the imbalance in the water and financial "assets" available to the environment as compared with those of the state and federal water projects at the outset? The draft fails to address these issues.

14. The draft fails to address the question of how environmental protection could be ensured when protective requirements exceed the water available to the ecosystem manager? How does CALFED's articulation of the EWA concept mesh with the potential need (which all hope to avoid) for even more stringent environmental standards in the future if the ecosystem continues to deteriorate? The draft EIS/R should be revised to evaluate the relationship (if any) between the EWA and regulatory assurances.

15. What would be the relationship of an Environmental Water Account to the broader issue of ensuring the availability of water to the environment as necessary to fully implement the ERP? The relationship of the Account to upstream water issues must be examined and resolved.

16. What would be the relationship between the Account and attainment of the performance standards embodied in the ERP and the Strategic Plan for the Ecosystem Restoration Program? The draft fails to address this issue as well.

No decision regarding the establishment of an Environmental Water Account should be made until each of these issues have been fully examined and resolved.

Recommendation: Revise the draft PEIS/R to address each of the issues listed above as well as the issues listed in Attachment 6, and the Issues listed in the Revised Phase II Report (at 100-101) under the heading "Issues To Be Resolved."

VI. ASSURANCES AND IMPLEMENTATION

The Assurances aspects of the Revised Phase II Report and draft PEIS/R are legally inadequate for NEPA and CEQA purposes. These sections contain virtually no proposal, even on a programmatic level, for an assurance package. For the most part, the draft PEIS/R outlines "what will be done" prior to the issuance of the ROD next summer. This fails entirely to meet the basic standards for environmental impact review and assessment. It is highly unlikely that mere lists of "principles" or even "functions" would pass legal scrutiny. Even programmatic documents are required to inform the public and decision makers of the proposal under consideration and its alternatives. For the most part, there simply is no assurance or governance proposal (see below) to review.

> ***Recommendation: The CALFED agencies should prepare a programmatic assurances and governance proposal and circulate it broadly to the public as soon as possible. Comments and recommendations should be incorporated into the next iteration of the PEIS/R.***

Our concern is particularly acute with regard to the absence of assurances for the ecosystem restoration program. Although the ERP is ambitious in many ways — the draft PEIS/R provides few assurances that CALFED will be capable of realizing it. The PEIS/R anticipates a major shift from regulation to money to achieve the restoration goals, but there is no plan for making such funding available.[3] Similarly, it is clear that the restoration goals will require substantial water for the environment; yet there are limited plans to make such water available. (See above re the proposed EWA.) Nor does the PEIS/R propose a clear institutional mechanism (either an old one or a new one), with appropriate mandates and legal authorities and tools, capable of implementing the ERP.

Finally, CALFED proposes no clear way of linking the progress of the ERP to progress in other program areas, as had always been assumed. The draft PEIS/R appears to neglect this issue entirely. There are "bundles" of actions proposed for Stage 1 — but how these bundles are linked is unclear. More critically, there is no plan for phasing or linking progress on achieving ERP objectives to the achievement of other program objectives or actions.

In sum, there is little in the draft to give the public confidence that the ERP performance

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[3] **Because the ERP quite correctly anticipates restoration well beyond that contemplated by existing laws — ESA, CWA, CVPIA — we assume the ERP will require greater financial assets than currently available to restoration** efforts. Although some additional funds can no doubt be squeezed out of consolidation and greater "efficiency," the **reality is that the ERP will require new funding. There is limited new ecosystem funding available beyond the $390 million held in escrow as part of Prop 204. The federal Bay-Delta Act expires this year and there is as yet no proposal introduced to extend this authorization. Less than half of the $430 has been appropriated. Even if extension language is introduced, CALFED has made clear its preference that this funding be made available for a wide variety of programs, not just the restoration effort. Thus it is extremely unlikely that the full $430 will ever be available for the restoration program. We are aware of few other new funding sources for the ERP.**

standards can be assured.

A. Abandonment of the "Assurances" Concept

Assurances issues are spread throughout the draft PEIS/R but are never discussed comprehensively in any one place. Thus, it is not possible to assess the assurance mechanisms that CALFED is proposing for the various program elements in relation to one another. It is impossible to determine whether there is an "assurance package" at all, and whether the assurances CALFED is proposing provide the balance and parity among the program elements so central to CALFED's overall success.

Moreover, the entire concept of "assurances" in the sense of trying to assure that program performance standards are met, has been replaced in the PEIS/R by the far less ambitious concept of "implementation." Save The Bay concurs that it is appropriate and prudent for the CALFED agencies and Bay-Delta Program staff to include implementation planning in the draft PEIS/R. Particularly for a program of what appears to be unprecedented magnitude, the agencies' proposal for implementation is critical to assessing environmental impacts.

However, merely laying out a list of programs and projects that the Bay-Delta Program intends to undertake in the first post-ROD years does not constitute a set of assurances that performance standards will be achieved or that the program elements will proceed in some sort of parity with one another.

Equally troubling is the suggestion that mere implementation, in the sense of selecting projects or obtaining permits is the goal rather than achievement of the performance standards of the program. The Implementation Plan does not seem to acknowledge that its very purpose is to achieve the CALFED performance standards. There is little explanation tying the Stage 1 actions to the ERP performance standards, for example. Perhaps this is assumed to be self-evident. However, there is a substantial record of disappointment in large-scale ecosystem restoration that has often been attributed to an over-eagerness to "implement" without an appropriate focus on achievement.

> ***Recommendation: Revise the Implementation Plan and Stage 1 Funding Proposal to demonstrate the linkage between the Program's objectives/performance standards and the actions proposed for implementation in the near term. This should include specific justification for why these — and not other actions — will best facilitate the adaptive management/information gathering principle.***

B. The Draft PEIS/R Must Include a Comprehensive Assurances Package

> Save The Bay and our EWC colleagues have on previous occasions provided the Bay-Delta Program and the Policy Group with a list of issues that must be addressed in an assurance package. (See Letter from Environmental Water Caucus to Lester Snow, March 3, 1998, enclosed here as Attachment 7; see Attachment 1 at 34-40.) We are surprised and dismayed that few of these recommendations (other than the performance standards) have received any serious consideration in the PEIS/R. This is a serious error

that must be remedied in a revised and recirculated portion of the EIS/R.

Recommendation: The PEIS/R should be revised to examine a complete package of assurances for achieving the ERP as outlined in the EWC letter of 3/8/98 including:

1) Strong ERP with measurable performance standards
2) Legal mandates to achieve performance standards
3) Institution dedicated to ERP implementation with sufficient authority
4) Water
5) Funding
6) Enforcement of baseline (pre-CALFED) environmental protections
7) Controls on water project operations
8) Physical constraints on new development
9) Phasing/linkages of other program elements
10) Remedies

As discussed below, the PEIS/R fails to provide a clear proposal for an institutional mechanism with the mandate or the authority to ensure the ERP will be fully implemented.

The Financing Plan makes little effort to identify, much less analyze, options for ensuring the substantial funding that will be necessary for ERP implementation. This omission is especially grave in light of the PEIS/R's general distaste for further regulation ("prescriptions") in favor of financial solutions. Moreover, our repeated recommendations that CALFED at least explore options for dedicated funding sources have not been addressed in the PEIS/R. It may be that no such sources are available or feasible; but in light of the program being proposed — and the near total reliance on dollars to make this program real — the Bay-Delta Program has a clear obligation to explore this option.

There is some discussion of an environmental water account, but it is not clear that the proposal in the PEIS/R for such an account would actually produce the water needed for ERP implementation or whether it would simply be a tool for limiting the impacts to water users of current environmental protections. Our repeated requests that CALFED explore the benefits of proposing an instream water right have not been addressed in the PEIS/R. This is a reasonable alternative and is clearly required to be given consideration under NEPA and CEQA.

Recommendation: Revise the PEIS/R consistent with the comments above and those included in Attachment 1, pp. 35-40.

C. A Phasing and Linkage Plan Must be Developed

Parity and balance have long been central to the development of the CALFED program. So it is surprising that the draft PEIS/R does not contain a plan to provide mutual assurances through a

phasing plan or program linkages. There are phases, to be sure, but they do not appear to have been constructed with a view toward ensuring balanced progress. For example, nothing in the Stage 1 storage and conveyance programs appears to be linked to progress on the ERP.

> ***Recommendation: Develop a linkage plan as part of the assurance strategy with specific ties to progress in program areas.***

The concept of "bundles" appears throughout but is never explained. The Stage 1a bundles appear to be largely geographic or administrative. Certainly for administrative or funding reasons it may be efficient to group actions along these lines — it is certainly appropriate in standard NEPA/CEQA terms to "bundle" actions likely to involve cumulative impacts or to inter-connect in other ways. However, this does not rise to the level of ensuring "balanced" progress among the CALFED Program elements. Nothing in the PEIS/R indicates that the bundled actions (IP at 30-40) are of comparable importance in terms of moving forward with the ERP performance standards and the other program elements.

Given the vastness and complexity of the CALFED Program, it will often be the case that priorities for one program element are not translatable into physical bundles of actions. It is likely to be the case often that restoration priorities will need to take place far from actions that are a priority in meeting the water quality goals. While geographic bundling should occur when possible, and all efforts should be made to avoid inefficiencies in implementation, it is critical that each program be able to clearly identify its priorities and implement them.

> ***Recommendation: The PEIS/R should be revised to clearly articulate the theory behind bundling generally, the State 1a bundles in particular, and to justify the Stage 1a actions as those most critical to take for purposes of long-term restoration, and clarify the reasons for the decisions to "bundle" the Stage 1a actions as has been proposed.***

VII. MULTI-SPECIES CONSERVATION STRATEGY AND ESA ASSURANCES

Separate from its Implementation Plan, CALFED has prepared a multi-species conservation strategy. The primary purpose of this strategy is to address the nexus between CALFED's affirmative ecosystem restoration program and federal and state endangered species obligations. This nexus occurs in two broad ways:

> 1) The CALFED Program is likely to have ESA and CESA impacts, requiring accommodation and in most cases "incidental take" permitting.[4]
>
> 2) The ERP should be designed to be consistent with relevant recovery efforts for listed, or jeopardized species.

There are several very positive aspects of the Conservation Strategy, primarily in ways that address the second consideration listed above. For example, the Strategy appears to have productively identified distinctions between species for which the ERP should serve as a recovery vehicle, where the ERP should contribute to recovery but not take on the full burden of meeting this goal and where the ERP's relationship to a listed species is more tangential. The Strategy is also very useful to the extent that it is intended to serve as an overlay on the ERP ensuring appropriate environmental mitigation and that CALFED projects do not undermine ESA recovery.

The more troubling aspect of the Conservation Strategy is the extent to which it is intended to provide "programmatic" assurances for the water development aspects of CALFED. The Strategy is intended to serve as the basis for Section 7 consultations for programmatic biological opinions under the ESA and as a Natural Community Conservation Plan under state law. MSCS, ES-7. Save The Bay appreciates the caution with which the Strategy approaches this very volatile issue and notes that the Strategy specifically provides that the programmatic documents being prepared under the auspices of the Strategy will not fully comply with state or federal endangered species statutes. We appreciate as well that the Strategy is geared largely to establishing a "streamlined" consultation process.

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[4] **This is true primarily with regard to the storage, conveyance and other developmental aspects of the program but it is of course possible that implementation of the ERP itself could have adverse impacts on listed species.**

A. The Preferred Alternative is not Sufficiently Identified or its Impacts Analyzed to Support the Development of Programmatic ESA/CESA Assurances

As indicated herein, we are deeply concerned about the lack of information and limited analysis regarding CALFED's preferred alternative, particularly the extent to which the long-term plan will result in the development of new water facilities and further depletions from the natural system. Given the very vague and preliminary nature of the information available about projects, let alone their impacts, it is clearly premature to be preparing even programmatic ESA and CESA assurances. Far more must be disclosed about the nature and extent of the development facilities at issue and their potential impacts on listed species before it is reasonable to begin implementing a strategy to provide ESA and CESA assurances — even programmatic ones. Because the PEIS/R fails to adequately identify the water development aspects of the CALFED Program, we cannot concur with the statement throughout the Conservation Strategy that it should "serve as the biological assessment of the CALFED Program in support of the Section 7 consultations" and be the basis for a programmatic NCCP.

This concern does not extend to implementation of the ERP, for which programmatic assurances may be appropriate, for two reasons. First, far more is disclosed in the EIS/R about this program and the site-specific actions intended for near-term implementation. This makes impact analysis and evaluation for purposes of CESA and ESA far more feasible. Second, the Conservation Strategy and the ERP are designed to have largely compatible restoration goals.

For the same reason, it is clearly inappropriate for the agencies to plan to enter into an MOU at the time of the ROD to adopt fact-findings regarding the impacts of the CALFED Program overall. The draft PEIS/R provides little basis for confidence that sufficient information regarding the water development aspects of the CALFED program will be sufficiently disclosed, and subject to public review and comment, prior tot he issuance of the ROD. It is not appropriate, based on the current draft with the extremely limited information available, to assume that it will be appropriate to enter into the contemplated MOU.

B. Conservation Strategy Should be Coordinated with Assurance Package

As discussed above, the PEIS/R currently provides virtually no assurances that the ERP's performance standards will be realized. A major failing of the document overall, and the Conservation Strategy in particular, is to bring together assurance issues. The Strategy theorizes that the need for new conservation measures will decrease as conditions for covered species improve. Save The Bay certainly hopes this will be the case and will continue to work toward this end.

However, based on the information available, it is entirely possible that this result may prove illusive. The assurances provided by the Conservation Strategy must be specifically and directly

tied to assurances regarding achievement of the ERP performances standards as well as the Conservation Strategy's own objectives in a formal and enforceable way. This aspect of the "ASIPs" must be clarified and the entire discussion of the "no surprises" assurances anticipated to be provided by the Strategy must be addressed in the context of the governance, financing and assurances issues outlined herein.

C. Funding

We note that the Conservation Strategy provides no discussion regarding financing of the environmental measures and in this regard exacerbates the problem in the CALFED financing plan. Because this is intended to function as a single integrated restoration plan, the Conservation Strategy and ERP financing issues should be addressed together.

VIII. GOVERNANCE ISSUES

As indicated above, the one assurance issue that is somewhat fleshed out in the draft PEIS/R is the institutional structure for the Program overall and its individual elements. There are positive aspects of the approach proposed, but the draft still suffers from a failure to articulate a clear institutional proposal, on either level, and from a failure to provide a reasonable range of institutional alternatives for consideration by the public and decision makers.

The Governance Plan is focused primarily on specific near-term implementation issues. It does not provide a programmatic framework for ensuring adequate institutional support for the CALFED Program or its elements. There are hints about where such a framework may go in the long run. But it is clearly insufficient for NEPA and CEQA purposes to tell the public that it will be informed of this decision in a final EIS/R once the opportunity for review and comment has passed.

Recommendation: Revise and recirculate he governance section of the Implementation Plan to identify a clear (preferred) institutional approach and a reasonable range of alternatives.

A. The PEIS/R Should Clearly Identify the Three Levels of Governance at Issue

Since the release of the draft PEIS/R, some useful work has gone forward regarding institutional assurances. In particular, the Assurances Work Group, and some members of the Policy Group, have reached basic agreement about the 3 levels of governance at issue for CALFED over the near and long term:

1) Oversight — meaning Policy Group level review of overall CALFED Program progress.

2) Management and Inter-Program Coordination — meaning primary responsibility for day-to-day mange of each of the program elements and lateral coordination between the elements.

3) Direct Implementation — meaning actual execution of specific projects or programs.

It is also recognizes that these 3 levels of action could take place all in one entity or spread out among many; there are a very large variety of institutional options.

Recommendation: Revise the PEIS/R to clearly identify this issue and clarify that the task in assessing institutional options is determining the optimal assignment of these levels of responsibility for purposes of achieving CALFED's objectives.

B. The PEIS/R Must Clearly Identify Institutional Responsibility for Meeting the CALFED Program Performance Standards

Save The Bay concurs with the emphasis in the near-term Governance Plan on the creation of various inter-agency teams to work together on program elements that cut across jurisdictional boundaries. We agree as well that a certain amount of participation by non-agency staff reporting to the CALFED Policy Group (or its successor) could be useful and appropriate in ensuring greater awareness and coordination with the other CALFED efforts. We strongly concur as well with the general trend in the Governance Plan to inject independent technical or scientific review into the management of the ecosystem, water supply reliability, water quality and levee programs.

A major problem with the Governance Plan overall is that it sidesteps the key question of which institution — if any — is assigned responsibility for meeting the performance standards of the four CALFED program objectives (or the eight CALFED "elements"). This is a critical issue for either the interim or the long-term implementation of the program. It drives governance issues on both the management and oversight levels.

However, as currently drafted, it is not possible to ascertain the CALFED agencies' proposal — if there is a specific one — for where, or with whom, management level authority and responsibility for moving the program elements from the ROD will lie.[5]

As drafted, the PEIS/R outlines management level responsibilities for each program element primarily for the "interim." Overall, the basic approach is that the current Bay-Delta Program would move from its primary task of planning and preparing the programmatic documentation into an inter-agency coordination role. For each of the eight (proposed) program elements, the PEIS/R indicates the Bay-Delta Program staff would play a primary, but unclear, role. In most cases, agencies with existing mandates closely related to the specific CALFED program element at issue is assigned to "work with" the Bay-Delta Program staff. And in most cases (as discussed above) it is proposed that there be established some sort of inter-agency team as well.

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[5] In this regard, we appreciate that ultimate responsibility for meeting the Program objectives will lie with whoever is responsible for overseeing the entire program. However, whether that oversight function is carried out by the Policy Group in its current form, or the Board of a new entity, the fact remains that primary responsibility for achieving the objectives will always lie on the management level, where most of the key decisions will have to be made. It is not reasonable to anticipate that an oversight Board can micro-manage a program of the scale and magnitude envisioned by the PEIS/R.

This type of structure has a lot of merit. It could conceivably foster a high degree of interagency cooperation and efficiency. However, it is essential that the PEIS/R provide considerably more clarity about the roles of these different institutional players in managing the program elements, and specifically with whom ultimate authority rests.

If the ROD is intended to provide a blueprint, the all-important question is who will take that map and navigate the way from there. The PEIS/R correctly identifies the necessary players, but it fails to propose an ascertainable institutional framework for them. Who will be assigned the mandate to achieve, for example, the water use efficiency program objectives? If it is some combination of the many groups and committees and agencies and Bay-Delta Program staff, that proposal should be made clear and its efficacy analyzed.

In addition to sidestepping the question of who is ultimately responsible for the management level, the PEIS/R fails to provide any analysis of the institutional tools necessary to carry out the program elements. Nor does it provide any information about the extent to which the players it has identified for each program element have those tools, or what would be necessary to obtain them. These analytical failures apply to the interim proposals as well as the long-term proposals (to the extent long-term proposals are identified).

To the extent that agencies do have the necessary funds and/or authorities to carry out interim implementation, the PEIS/R fails to discuss or disclose how these new proposed teams would function. For example, the draft suggests that funds could run through the Bay-Delta Program, but this has been highly problematic. Little mention is made of this.

Recommendation: Revise the PEIS/R to squarely address the assignment of responsibility for management of the program elements. While variations are infinite, there are 3 basic options that should be identified and analyzed:

1) **A new institution to provide both oversight and lead agency authority.** Lead responsibility for achieving performance objectives for all eight CALFED program elements would be assigned to the Bay-Delta Program, reformulated as a new federal/state entity with a clear legal identity. Its governing board would consist primarily of the current Policy Group makeup with some modifications. Legislation establishing this entity would be required. The entity's governing board to provide oversight for the entire CALFED Program. Mange functions to be performed by staff. Division Directors would be assigned responsibility for each of the CALFED program areas. They would do all budgeting, program priority setting, work with scientific review panels as appropriate. No authorities would be taken from existing agencies.

   Existing agencies would participate: (1) on the board; and (2) in direct implementation activities. They would work with the new entity in formulating mange level decisions, via various inter-agency teams, but would not have direct management level responsibility. Existing agencies would not have new mandates or

funding to achieve CALFED program standards (other than in their roles oversight and direct implementation roles). Funds for all CALFED program implementation to run mainly through the new CALFED Bay-Delta entity.

2) Oversight and lead agency authority separated institutionally but formally coordinated. Lead authority for meeting program standards assigned to agencies — or teams of agencies — already primarily engaged in related activities (or possibly, for the eco-program, some sort of conservancy). CALFED Program oversight would be provided by a new entity formalizing the Policy Group in some way, but this new entity would not have specific responsibility for on the management level. Staff of the oversight entity would work with the lead agencies, or agency teams, on management level issues. Legislation providing lead agencies with mandates and authorities necessary to carry out the CALFED program (but currently lacking or unclear) would be required, but no existing authorities would be taken away. Same legislation could establish the new oversight entity if legislation is deemed necessary. Program coordination at the management level would be achieved through a formal agreement among the lead agencies and the oversight entity.

Commission staff would not have lead authority for achieving performance standards but would be responsible mainly for ensuring coordination, identifying areas of conflict and facilitating resolution, and staffing the Commission Board. Program funds to run mainly through lead entities, but only after approval by Commission. Funds for Commission staff to run directly to Commission.

3) Responsibility for lead agency authority shared between oversight entity and other agencies. A new Bay-Delta oversight entity would share mandate for achieving the CALFED performance standards with existing agencies. Staff similar to that described in Option 1 above, but with more integrated involvement with agencies which would also be formally tasked with achievement of the performance standards. Responsibility for program budgeting, identification of priorities, and other management responsibilities etc. to be shared between the oversight entity and agency staffs. Legislation similar to Option 2 above would be required, but no existing agency authorities would be taken away. CALFED Program funds would run mainly through the oversight entity instead of the agencies.

Within these broad categories are an infinite number of variations that could work. With each the CALFED agencies need to examine several questions related to the likelihood of meeting the performance standards including but not limited to the following:

- Which will most facilitate the long-term funding required?
- Which is most likely to provide a workable forum for the various CALFED mandates?
- Which will ensure that each program element has an advocate of equivalent abilities/authorities?

- Which is most compatible with agency objectives?
- Which builds best on existing positive momentum?
- Which is most likely to allow for consolidation of related or redundant programs over time?
- Which is most likely to promote accountability for expenditures as well as performance?

C. Oversight Governance Issues

We agree with the premise that oversight of the CALFED Program will be important going forward. In particular, oversight if properly constructed should ensure that the managers of the CALFED program elements are in fact cooperating appropriately and that the Program objectives are being achieved in parity. If necessary, the oversight group should be in a position to remedy imbalances that arise over time.

As drafted, the PEIS/R identifies various oversight "functions" and principles, but as discussed above, does not analyze the relationship between the oversight and management levels. It fails to ask key questions necessary for the public and decision makers to come to a reasonable decision about the appropriate forum, and mechanisms, for CALFED Program oversight, including but not limited to:

- Is there some benefit from establishing some distance between the group responsible for oversight and the entities responsible for the management of the program elements? In other words, if management and oversight are housed in a single entity, would the governing board in effect be overseeing itself?

- Would it be ideal to have all funding for each of the CALFED program elements run through a single oversight entity? Is this politically feasible?

- Should oversight include budgeting? Or should oversight be limited to review of budgets developed by program managers?

- To what extent should program priorities be made top down -- from the oversight group to the program managers? To what extent should the process be the reverse, with program managers having primary authority to recommend priorities for review by the oversight group?

Recommendation: Revise PEIS/R to include a fuller discussion of what CALFED Program oversight should and should not entail. Provide a reasonable range of oversight options, not merely a list of institutional housings for oversight.

D. The Need for an Ecosystem Entity

Considerable effort has gone into discussing whether some sort of ecosystem restoration entity should be proposed to implement the ERP and Strategic Plan. Rather than attach the volumes of paper that have been written on this subject, Save The Bay incorporates all of our correspondence, and the EWC's, on this subject herein by reference.

The PEIS/R outlines the various legal options for establishing a restoration entity, but fails to disclose or clarify for the public or decision makers the basis for the proposal to develop some sort of focused institutional home for the ERP implementation. This is a serious omission and should be rectified in order to facilitate decision making. It is clear that outside of the very limited world of the BDAC Assurances Work Group this issue is not well understood.

In brief, one of the primary assurances problems in achieving the ecosystem restoration program's performance standards is the high degree of fragmentation among the current ecosystem managers, in terms of both legal mandates and geographical jurisdictions. The ERP is extremely ambitious and broad, and correctly takes a comprehensive ecosystem approach to the myriad of problems facing the Bay-Delta watershed and the Central Valley Basin. There is simply no existing state or federal agency with all of the legal tools, or the mandates, or the geographic authority to implement this program comprehensively. (See Letter from Save The Bay and the Ag/Urban Group to Secy. Wheeler and Asst. Admin. Perciasepe, October 14, 1998, enclosed here as Attachment 8.)

> ***Recommendation: Revise the PEIS/R (specifically Gov. Plan Sec. 4.4.3) to identify the particular institutional problems associated with implementation of the ERP. In particular, the PEIS/R should disclose the types of authority and geographic range entailed in implementation of the ERP, and it should then provide an analysis of the capacity of FWS, NMFS, CDFG, SWRCB, EPA and other appropriate agencies -- either alone or in tandem -- to carry out this program with no change in existing mandates, legal authorities or funding.***

The PEIS/R references a workshop on this issue that was planned, but did not take place until after the release of the PEIS/R. The most consistent and clear piece of information to come out of that important effort is that in each of the four restoration case studies discussed (the Everglades, the Colorado River, the Columbia River and the Exxon Valdez Spill), the relevant authorities came to exactly the same conclusion that the Assurances Work Group has here: The most efficient and effective way of ensuring a focused restoration effort that cuts across agency lines is to create an entity that has as its primary (and usually sole) mission, achievement of the restoration program. Obviously such entities take many forms (trusts, commissions conservancies) and never work in isolation from the existing agencies with related duties and

obligations.
But the critical point nowhere addressed or disclosed in the PEIS/R, is that this type of focused effort and advocacy is widely considered to be a necessary (but of course not sufficient) element in obtaining large-scale restoration. Often such entities — far from being rogue agencies — are the forum for unprecedented levels of cooperation and support for issues that either fall between agency cracks or are simply too overwhelming for any one existing agency to shoulder.

The PEIS/R does a credible job of setting forth six legal options for establishing some sort of restoration entity. It fails, however, to analyze the need for such an entity in the context of assuring successful implementation of the ERP performance standards. To the extent that Option 1 is in essence the "no action" institutional alternative, it fails to fulfill that role. It may be that the wisest course is not to follow in the paths of other regions that have decided to establish specific entities responsible for their particular ecosystem restoration problems. But additional information and analysis is required in the PEIS/R before that decision can be most confidently made.

> ***Recommendation: Revise the EIS/R to address the question of whether some sort of focused institutional home for the ERP would make achievement of the performance standards more* likely. *Briefly review large scale eco-restoration efforts around the country and disclose the reasons that in most the decision to establish a focused entity was made, the problems and successes other such entities have faced and the feasibility of translating those experiences to the unique Bay-Delta situation. Provide a full discussion of the no action alternative — the current agency status quo in addition to the Bay-Delta Program's Restoration Coordination Program.***

E. Governance for the Water Supply Reliability Program

The problems with the decision not to clearly identify a water supply reliability program with clear performance standards are apparent in the governance section. The current proposal is for the 4 water supply reliability programs to have largely separate governance and implementation structures. This makes it far less likely that the program will be run in an integrated fashion or that it will be possible for the public and those with program oversight — whoever that ultimately may be — to assess the supply reliability program as a whole.

> ***Recommendation: Revise the PEIS/R to integrate the implementation and governance structure for the four WSR program elements.***

IX. FINANCING ISSUES

A. Storage Studies

CALFED has determined that although it has adopted a "beneficiaries pays" principle, it will seek public financing for all storage development up until construction. (Phase II Report at 92.) At that point, project beneficiaries would repay the public funds used for planning.

There has been significant debate over the last three years regarding funding for storage and when a "study" ceases to be a study and is in fact project implementation. We appreciate the role for public funding in project evaluation, particularly at the programmatic level. However, CALFED has adopted an unusual and somewhat extreme approach in calling for public financing of storage projects up to the construction phase. In many cases, project proponents (beneficiaries) are expected to, and do, pay most or all of the development and permitting costs once a project has received early approvals.

For example, once it is determined that groundwater project X will be developed and efforts move into the site specific EIS stage, "comprehensive and fair comparison of storage options" will have been achieved and it is appropriate to require project beneficiaries to begin taking on the burden of what is not so much "study" as project development and implementation.

> ***Recommendation: Revise EIS/R to clearly define "studies" versus project implementation phases and require implementation of the beneficiaries pays principle well prior to construction.***

X. POTENTIAL FOR BENEFICIAL REUSE OF DREDGED SEDIMENT

The draft PEIS/R fails to evaluate the potential for beneficial reuse of dredged sediments. Save The Bay has recently completed a feasibility study of this subject. (See Attachment 9.) We also reiterate our comments submitted last summer on this subject. (See Attachment 1 at 29-30.)

Recommendation: Revise PEIS/R to evaluate the potential reuse of clean dredged materials from the Bay for habitat restoration and levee maintenance. The EIS/R should evaluate the extent to which such reuse could:

1) make possible particularly valuable habitat restoration;
2) manage potential salinity impacts;
3) create funding partnerships with Bay Area dredgers; and
4) compliment (or compete with) the restoration of Hamilton Field and other beneficial reuse opportunities in the Bay and Delta.

Save The Bay
1600 Broadway, Suite 300
Oakland, CA 94612-2100
October 7, 1999

Melissa Loscher
California Dept. of Water Resources
1416 Ninth St. Suite 252-35
Sacramento, CA 95814

Dear Melissa,

I have emailed you the comments of Save San Francisco Bay Association on the CALFED Environmental Impact Report. Enclosed are the attachments listed in the table of contents:

1. **STB Comments on CALFED-BAY Delta Programmatic EIS/R, July 1998**
2. **8/12/98 Letter to Wheeler and Perciasepe**
3. **10/15/98 Letter to Wheeler and Perciasepe**
4. **Blueprint for an Environmentally and Economically Sound CALFED Water Supply Reliability Program**
5. **3/24/99 Letter to Lester Snow**
6. **12/9/98 Letter to Bruce Babbitt**
7. **3/3/98 Letter to Lester Snow**
8. **10/14/98 Letter to Perciasepe and Wheeler**
9. **Opportunities for Delta Reuse of Clean Material Dredged from San Francisco Bay**

Sincerely,

Alice Chinn

ATTACHMENT ONE

Comments of Save San Francisco Bay Association on the CALFED-BAY Delta Programmatic Environmental Impact Statement/Environmental Impact Report

Contents

Save San Francisco Bay Association

July 1, 1998

INTRODUCTION

Save the Bay believes that the CALFED Bay-Delta program offers tremendous potential to address ecosystem and water supply reliability issues. Strategies are available which could contribute substantially to restoration of the Bay ecosystem and improvement of water supply reliability for water users. We believe that CALFED has the potential to resolve long-standing Bay-Delta disputes. CALFED can demonstrate the water supply benefits of ecosystem restoration (e.g. reduced uncertainty and exposure to mitigation costs) and the potential ecosystem benefits of some water supply programs (including reduced pumping at critical times, land retirement and water transfer programs which could benefit water users and the environment).

A sound environmental document is a key to bringing stakeholders together and engendering sound decision-making by responsible agencies in the CALFED process. Unfortunately the draft EIS/R is technically and legally inadequate to form the basis for any Bay-Delta ecosystem or water management decisions, near- or long-term. Program objectives are nebulous and equivocal, particularly with regard to the water supply reliability element. The draft identifies a highly constricted range of alternatives that closely resemble one another. Analysis of environmental impacts of the alternatives that are under review is limited, technically insufficient and inadequately documented. The draft fails to discuss project impacts in relation to historic ecological conditions. Key assumptions are not clearly articulated or even identified in many cases. There is virtually no analysis of the environmental impact of various economic factors – the draft does not even contain a preliminary least cost analysis with regard to water management. There is no discussion of mechanisms to provide assurance (and enforcement opportunities) that program elements will be adequately implemented, notwithstanding near universal agreement that such assurances are central to determining the feasibility of the alternatives under review. Moreover, despite the bulk of the document and the various technical appendices, little actual information is provided since the same analysis is repeated – often verbatim – in several different places.

The draft EIS/R is technically and legally inadequate to form the basis for any Bay-Delta ecosystem or water management decisions . . .

CALFED has requested comment on six issues. We respond to these briefly below.

1. Are the assumptions and technical evaluations in the EIS/R valid?

It is often almost impossible to ascertain CALFED's assumptions based on the draft EIS/R. We are concerned that several key assumptions, particularly regarding Bulletin 160-98's demand projections, are not valid. The technical evaluations performed by CALFED are not so much invalid as absent. As described below, the EIS/R contains remarkably little information about the affected environment, the project alternatives and most importantly, the potential environmental impacts of the proposals.

2. Are the common programs adequate to ensure program success?

The common program elements are not described in sufficient detail – even for a programmatic EIS/R – to answer this question. In general, Save The Bay maintains that the Ecosystem Restoration Program is quite modest given the ambitious goals for the program. The water use efficiency program is even more limited.

3. How well do the alternatives meet the CALFED solution principles?

It is not clear that any of the alternatives under review satisfy the solution principles. As discussed below, CALFED has failed to examine any alternative that does not posit the construction of new water development facilities, but rather, achieves the water supply reliability objective through "soft path" avenues. Moreover, the extremely limited information and analysis in the draft EIS/R – even for a programmatic document – precludes reaching any conclusions at this point regarding the superiority of any alternative.

Save the Bay recommends that CALFED revise the document to include an alternative which would meet CALFED's water supply reliability goals without additional depletions by utilizing improved water management and water efficiency programs. In fact, by increasing the amount of water dedicated to environmental restoration through a more ambitious ERPP, such an alternative could reduce net depletions from the system.

4. Is construction of new water facilities acceptable to the public?

This is really an issue of political feasibility and appears to be quite premature since the analysis provided so far fails to establish either (1) a compelling technical need for such facilities; or (2) assurances that such new facilities would not cause further environmental degradation. At this point, Save The Bay remains opposed to the construction of new surface water storage reservoirs, new dams and/or a peripheral canal.

CALFED has failed to examine an alternative that does not posit the construction of new water development facilities. . .

5. Are beneficiaries willing to pay for a comprehensive Bay-Delta solution?

Save The Bay supports this as one of the guiding financing principles for CALFED. However, its validity is being undermined as the definition of "beneficiary" expands such that the public winds up being the beneficiary of all program elements. To the extent that CALFED moves down the path of providing new public subsidies for developed water, Save The Bay will not support the financing program.

6. Can an adequate assurance package be devised?

There is little doubt that such a package can be crafted. However as discussed below, the draft EIS/R makes little or no movement in that direction. It provides no clear overview of what such a package should entail or the options available for putting such assurances in place.

In sum, while Save The Bay remains committed to the CALFED program, the draft EIS/R is wholly deficient. Even the revised schedule which anticipates a supplemental draft EIS/R by the end of the year is obviously inadequate. We strongly recommend that the CALFED Program and the CALFED Policy Team reconsider the expense and effort attendant to producing yet another rendition of a document that is very likely to once fail to again to pass legal or technical muster and instead devote those resources to crafting a high quality document in a reasonable time frame.

Our specific comments and recommendations are outlined below. These comments are divided into two major parts. The first section deals with the environmental impact analysis in the EIS/R and several of the "technical appendices." The second part addresses CALFED's approach to assurances and implementation issues.

Part I: Draft Environmental Impact Statement/Report

A. Standards for Programmatic EIS/R

The draft EIS/R fails entirely to meet the legal requirements for a sufficient programmatic review under the National Environmental Policy Act, 42 U.S.C. 4371 et seq., (NEPA) and the California Environmental Quality Act, Pub. Res. Code 21000 et seq., (CEQA). Programmatic EISs and EIRs have the same fundamental purpose as site specific EISs and EIRs: to inform the public and decision-makers of a program's environmental consequences before decisions are made. A programmatic EIS/R must provide the basis for decision-makers to determine whether subsequent actions may have significant environmental effects. It should address the environmental effects of the proposed program specifically and comprehensively.

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To the extent that the EIS/R omits relevant information, it effectively precludes the informed decision-making that is the central objective of CEQA and NEPA. Thus, for example, the EIS/R must consider alternatives that would substantially avoid or reduce the adverse impacts of the program, even if such alternatives would impede to some degree the attainment of the project objectives. Similarly, the document must contain enough information about each alternative to allow meaningful evaluation and comparison of impacts.

Thus, it is not sufficient for a programmatic EIS/R to merely provide general policy guidelines as to relevant environmental factors; it must ensure that decision-makers consider all of the specific and particular consequences of their actions and the alternatives available to them. This standard is particularly crucial at the programmatic stage since subsequent site-specific EIS/Rs often rely heavily on the environmental analysis conducted in the programmatic review. CALFED may not defer analysis of key environmental impacts to the project-specific stage. As the courts have found, "tiering is not a device for deferring identification of significant environmental impacts that adoption of a specific [alternative] can be expected to cause." Stanislaus Natural Heritage Project v. County of Stanislaus, 48 Cal. App. 4th 182 (1996). The adequacy of the environmental impact analysis in the CALFED EIS/R is all the more important since the agencies intend to use this document as the project-specific environmental review for at least part of the program.

As discussed below, the draft EIS/R must be substantially revised and expanded to provide the public and decision-makers with the information necessary to make sound decisions about the CALFED Bay-Delta program.

B. Geographic Scope of the Bay-Delta Program

The CALFED problem area should be redefined to include all of San Francisco Bay, including the South Bay. San Francisco Bay is inextricably linked to the Delta Estuary biologically and hydrologically. The draft EIS/R fails to provide a scientific rationale for arbitrarily excluding the Bay from the problem area of a "Bay-Delta" solution. While we appreciate that the Bay is included

in the "solution" area, there is little question that the problems facing the Bay that bear directly on the program objectives – and ecosystem quality in particular – are not addressed in the draft EIS/R.

> *We recommend that the EIS/R be revised to include all of San Francisco Bay in the CALFED "problem scope" area.*

C. Project Purpose

The general program purposes set forth in the draft EIS/R (pp. 1-5 to 1-8) are useful. However, they are extremely broad and vague, even for a programmatic NEPA/CEQA document. For example, the purpose of the ecosystem element is "to improve and increase" habitats and ecological functions. Thus, as currently set forth, almost any level of improvement in the current highly degraded system would suffice to satisfy this project purpose. However, CALFED's objectives for ecosystem restoration are far more ambitious than mere "improvement" of any kind. A clear and accurate project purpose is essential under state and federal law because it serves as a benchmark in determining the adequacy and sufficiency of the alternatives under review.

> *We recommend that the project purpose for the ecosystem restoration element be revised to state CALFED's objective of achieving broad fish and wildlife and ecosystem recovery and restoration in the Bay-Delta Estuary.*

Similarly, the purpose of the water supply reliability element, as currently drafted, is to "reduce" conflict between supplies and "current and projected beneficial uses." This is ambiguous, suggesting that the program will attempt to provide water supply to meet all future projected demand for Delta water. This is contrary to suggestions in other CALFED documents that the program's purpose is limited to stabilizing the reliability of existing water supplies and will not attempt to develop new sources of water to meet future demand projections.

> *We recommend that the project purpose for the water supply reliability element be revised to state CALFED's objective of addressing reliability of current needs and not to satisfy projected future demand for consumptive (urban and agricultural) uses.*

D. Ecosystem Goals and Objectives

1. Species Restoration Objectives are Too Limited.

Given the ambitious ecosystem restoration objective of the CALFED program, the goals of the ERPP are very modest. When all is said and done, CALFED is proposing to achieve "recovery" for only a handful of species already listed under endangered species laws. The ecosystem restoration program will only "contribute to" recovery for many others. While we are mindful of the need to set realistic and attainable goals, this crabbed approach to ecosystem recovery seriously undermines CALFED's stated objective of large scale ecosystem restoration and raises several important questions.

Foremost, what agency will take responsibility for species recovery if not CALFED? The implication of this approach is that the fish and wildlife agencies will be pursuing more extensive recovery efforts for listed and jeopardized species outside of the CALFED process. However, this would run counter to the entire premise of the CALFED effort which is to put a comprehensive ecosystem recovery plan in place that, among other things, minimizes water supply reliability disturbances. Moreover, CALFED is intended to enhance coordination among state and federal natural resource and water development agencies. Such coordination is undermined if a species recovery is planned and implemented in a forum outside of but parallel to CALFED. Finally, given the nature of the water supply reliability assurances under discussion, it is essential that CALFED set the bar high for its ecosystem recovery objectives.

We recommend that the EIS/R be revised to establish recovery of all listed species likely to be substantially affected by CALFED actions in the Delta and the Bay as the program objective.

We recommend that, as a preliminary matter, CALFED adopt the recovery criteria developed by the Delta Native Fishes Recovery Team for the fish species identified in that important inter-agency effort. Recovery criteria should be developed along the model employed by the Delta Native Fishes Recovery Team for each species identified on the "covered species list" that is being prepared for use in the Conservation Strategy.

E. Water Supply Reliability Program Goals and Objectives

Closely related to the problem discussed above, the draft EIS/R suffers throughout from a failure to identify the objectives of the water supply reliability element of the CALFED Program. This is in marked contrast to the intense effort to quantify, measure and specify the goals of the ecosystem restoration program and to develop measurable targets. The draft EIS/R and the myriad technical appendices fail to notify the public of the Program's intentions for the water supply reliability element beyond vague references to "increases" and "improvements."

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This defect mars the analysis throughout. For example, the draft EIS/R states that additional study will be required to determine "optimal storage sizes." But optimal for what purpose? The amount of storage "necessary" (if any) has everything to do with CALFED's assumptions about how much new yield (if any) is required to meet the Program's water management objective. Even the detailed "Problems and Objective Statements" (an appendix to the Program Goals and Objectives Technical Appendix) is framed entirely in vague intentions to "improve uncertainty" and "help meet" long term needs.[1]

[1] In addition, the status of the Problem and Objective Statement contained in the Technical Appendix is unclear. As currently drafted, it is little more than a comprehensive wish list for the stakeholder parties. CALFED has not identified how "objectives" that conflict with one another will be prioritized in evaluating the efficacy of the alternatives, or whether this document will be employed at all in the analysis.

This lack of specificity makes it impossible for the public and decision makers to evaluate the effectiveness of the alternatives. Are new dams and surface water reservoirs "necessary" to meet the CALFED water supply reliability goals for urban and agricultural water users? (We address the argument that such facilities are necessary for environmental purposes below). This question cannot be answered based on the draft EIS/R because CALFED has failed to identify clear goals for the water management element of its program. Thus, there can be no objective evaluation of the "adequacy" of the alternatives under review.

This reluctance to clarify the CALFED objective for the water management element is in sharp contrast to the drumbeat of insistence that the ERPP goals and objectives be "measurable" and "quantifiable." A basic CALFED principle is parity among the program elements. The parity of the entire program is undermined from the start if there is no demarcation of the benefits the CALFED Program is intended to provide to the consumers of developed water supply.

> *We recommend that the EIS/R be revised to identify specific and measurable water supply reliability goals and objectives for the consumptive sectors (urban and agricultural water users) to serve as a benchmark for evaluating the efficacy of the program alternatives.*

CALFED's shifting positions on this issue have compounded the problem. Last September's Phase I Final Report states that the water supply reliability program is intended to "improve the ability to transport water through the Bay-Delta system" (p. 6). However, the Phase II Report released with the draft EIS/R states that the objective is to "increase the flexibility to store and transport water" (P. 20). By defining success as increasing storage, this change in CALFED's water supply reliability objectives stacks the cards against a soft path solution.

> *We recommend that the EIS/R be revised to identify a water supply reliability program objective which focuses not on achieving a particular level of supply, storage or transfer, but rather on improving water supply reliability to contribute to the maintenance of healthy agricultural and urban communities and economies. The focus of this objective should be on the economic and other benefits of water supply reliability, not on an artificial and arbitrary supply number (as in the case of Bulletin 160).*

F. No Action Alternative

The purpose of the requirement for a "no action alternative" in both CEQA and NEPA is to ensure that the public and decision makers are able to compare the environmental impacts of the proposed project (and the action alternatives) to the option of not proceeding with the proposal. A separate and distinct requirement is that the EIS or EIR include a description of the "affected environment" or "the environmental setting," the physical area that will be affected by the alternatives under consideration. In a simple project, the No Action Alternative may be nothing more than the maintenance of the existing conditions.

CALFED has failed to identify clear goals for the water management element of its program

That is not the case for the CALFED program; with or without any CALFED action, existing conditions will change over the next decades as a result of (1) foreseeable physical changes in the system and (2) existing and foreseeable regulatory requirements. Thus, it is important to craft a No Action Alternative that provides the public and decision makers with a sense of what the

system will look like in light of these foreseeable changes even without any action by the CALFED program, and to distinguish this future scenario from a description of the resources in the affected environment. (See below.) However, the draft EIS/Rs analysis of the No Action Alternative – and comparison of project impacts to this option – is flawed for several reasons.

First, some of the assumptions underlying the No Action Alternative are troubling or unclear. Table 2-1 indicates an assumption that the 1995 WQCP is in place, but it fails to specify whether CALFED further assumes that such standards will be fully implemented, and if so, what further assumptions CALFED is employing about the water supply consequences of such compliance. For example, under existing conditions, the 1995 WQCP is implemented through Water Right Decision 95-6. Is CALFED assuming a continuation of this Decision? Or is it assuming that a new water right regimen will be adopted to replace 95-6? We note that at least with regard to the Vernalis standard, CALFED is apparently assuming that the Board will adopt the VAMP agreement.

Second, CALFED is assuming that certain CVPIA requirements are in place but is silent on implementation of the fish doubling plan required by CVPIA Sec. 3406(b)(1). Some of the water necessary to meet this baseline legal requirement will be provided by the 800,000 acre-foot dedication, but it is expected that additional water may be needed to implement the final fish doubling plan.

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Third, CALFED is assuming that there would be no new listings of endangered species in the study area in the absence of the CALFED program. This assumption is not warranted. Spring run salmon are likely to be listed under both state and federal statutes and several other aquatic species are either the subject of petitions or proposed for listing by the responsible agencies. The water supply impact analysis should take these issues into account in a revised document.

The draft should be revised to clarify what is meant by compliance with the Vernalis standard "subject to VAMP" for purposes of water supply assumptions in the modeling and what assumptions, if any, CALFED is making regarding the Board's adoption of any of the other "negotiated agreements" now pending before the Board, as well as other assumptions regarding implementation of the 1995 WQCP.

The draft should be revised to clearly identify CALFED's assumptions regarding the water supply impacts of full implementation of the fish doubling plan mandated by the CVPIA.

In the context of assumptions for the No Action Alternative, the draft should be revised to include at least ESA listing for spring run salmon, steel head trout and possibly other aquatic species that are now under consideration for listing such as Sacramento splittail.

G. Water Supply Reliability Alternatives

1. Description of Programmatic Water Management Alternatives Inadequate.

The discussion of alternatives in the draft EIS/R is wholly inadequate. (Chapter 2, Project Alternatives Appendix). The "overview" of the alternatives in the draft is so nebulous that it is impossible to ascertain what is under consideration. For example, Alternative 1 is described as including unspecified "modifications" and "improvements" intended to remove "regulatory constraints" to increased pumping.

The more detailed descriptions of the alternatives are not much better. We learn that the proposed modifications include "a new Clifton Court intake structure" and "channel enlargement along a 4.9 stretch in Old River." The reader has no idea what this new structure would consist of, how it would function, or what purpose it is intended to serve; there is no disclosure of what the channel enlargement would consist of, how it relates (if at all) to the new intake structure, or what its purpose would be. There is no disclosure of the "regulatory constraints" at issue and whether they serve an environmental or other legitimate purpose.

This problem is not remedied by recourse to the "Technical Appendix" on the project alternatives, which for the most part merely repeats the information in the main EIS/R. No additional information is provided regarding the nature or purpose of the new intake structure or the mysterious "regulatory constraints." This problem persists for each of the alternative water management configurations in the EIS.

Even at a programmatic level, NEPA and CEQA require more than a single sentence describing the facilities under consideration. It is also difficult to ascertain the proposed changes – what they are, what purpose they would serve – in the environmental restoration program that accompany each alternative due to the extremely abbreviated description of such actions. For example, Alternative 3 would modify the ERP to include unspecified "modifications" of the Mokelumne River Floodway and conversion of certain islands to "aquatic habitat." What is the purpose of these modifications and what do they have to do with Alternative 3? There is no way to discern the agency's proposal from the very limited description provided. The same problem holds true for descriptions of modifications to the other common programs.

Even at a programmatic level, NEPA and CEQA require more than a single sentence describing the facilities under consideration.

We do not suggest that the ERP, or other common programs, be reproduced in full in the EIS/R. However, CALFED is obligated to provide the public and decision makers with a clear picture of the alternative programmatic approaches to solving the Bay-Delta problems that are under review. This requires at a minimum that the EIS/R set forth a clear picture of the alternatives explaining how the various elements fit together in a coherent whole. The current draft contains little more than a list of program elements. This problem is exacerbated when the public and decision makers reach the analysis of the environmental impacts associated with each alternative. (See below.)

We recommend that Chapter 2 of the EIS/R be revised to describe each of the programmatic alternatives under consideration in sufficient detail to provide the public with a clear picture of (1) each of the program elements and (2) the different purposes or functions the program elements are intended to serve; and (3) how the program elements form a coherent alternative; and (4) the nature of the "regulatory constraints" at issue and analysis of the need for such constraints.

We recommend that the Project Alternatives Technical Appendix be rewritten to disclose all of the technical information supporting the development of the alternatives under review and to eliminate all material that merely repeats the text of the draft EIS/R.

2. Range of Water Management Alternatives Inadequate

The draft EIS/R fails to meet one of the most crucial NEPA and CEQA obligations, which is to provide the public and decision makers with an adequate range of alternatives. This requirement is particularly key at the programmatic stage since all later decisions will flow from the options addressed in the broader review.

However, the draft EIS/R considers a very narrow range of alternatives to address the water supply reliability element. All three alternatives anticipate substantial new water facilities intended to create even more developed water for consumptive use. Consideration of a reasonable range of alternatives clearly requires full evaluation of a non-structural solution for the water management element of the CALFED program. This is particularly the case since the very ecological destruction that CALFED is trying to remedy was largely caused by construction and operation of water development facilities that take water out of the natural system and divert it for consumptive use.

The draft EIS/R contains no explanation for this glaring defect. Nothing in the document suggests that water transfers, water conservation, recycling and other non-structural approaches would not be successful in addressing the water management objectives of the program. Nor can it be argued that this approach would be too expensive – federal studies establish that these "soft path" tools are far more cost-effective than building new water development facilities. CALFED is not compelled to select this "Alternative 4" simply by including it in the revised draft (as it is not compelled to select any of the three current alternatives), although we believe that a thorough analysis will reveal it to be the environmentally superior alternative.

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We note that CALFED has in the past refused to include a "soft path" alternative in its analysis claiming that "it won't work" and "the numbers aren't there." However, there appears to be no documentation in the draft EIS/R supporting these assertions. In part, this problem relates back to the program's failure to articulate clearly its objectives for the water supply reliability element. Analyses conducted by our colleagues in the Environmental Water Caucus clearly indicate that existing water use can be made substantially more reliable and predictable without the aid of new dams, canals or surface water reservoirs. To the extent that a soft path alternative is

infeasible, and we do not believe that it is, CALFED is obligated to provide that information to the public and decision makers.

We recommend that the EIS/R be revised to include full and complete evaluation of a water management alternative that relies on a combination of soft path approaches to achieving the water supply reliability objective of the CALFED program. (Note that Alternative 1A does not meet this criterion since it constitutes merely implementation of the common programs without an alternative management strategy to address water supply reliability.)

3. Analysis of the Benefits, Impacts and Assurances Aspects of "Dual Conveyance".

One of the reasons CALFED is considering a "dual conveyance" in Alternative 3 is to preserve the concept of the Delta common pool, which is intended, in part, to provide assurances regarding Delta environmental, water supply and water quality issues. However, the proposed operations plan for Alternative 3 includes low minimum Delta diversions through much of the year and no minimum Delta diversions in the Spring (Project Alternatives, p. 65). It is likely that such low levels of Delta diversions would provide little or assurances regarding Delta environmental, water supply and water quality issues.

We recommend that the EIS/R be revised to explore a full range of possible operations for an isolated facility, to explain the rationale for the proposed Delta diversion levels and to fully evaluate the benefits and impacts of the proposed operations plan, as well as the assurances implications of the proposed plan.

H. Ecosystem Restoration Alternatives/Adequacy of ERPP

1. The EIS/R Does Not Acknowledge Key Related Programs for San Francisco Bay.

The discussion of the Suisun Marsh/North San Francisco Bay Ecological Zone (ERPP, Vol. II, p. 99) does not acknowledge important related restoration programs: the Partnership for the San Pablo Baylands and the San Francisco Bay Joint Venture. Save San Francisco Bay Association, which coordinates the Partnership for the San Pablo Baylands, is currently preparing a plan for the stewardship of this area. This plan, which will be released in August, 1998, was developed in cooperation with agencies and local landowners and will provide a model for improved cooperation within CALFED and for strengthening of the ERPP. We believe that this plan will provide recommendations which should be included in the CALFED ERPP and preferred alternative.

The EIS/R does not contain any goals regarding the restoration of seasonal wetlands in the San Pablo Bay Area.

2. The ERPP's Restoration Goals for San Pablo Bay Are Too Modest.

We have previously discussed our opposition to the exclusion of portions of San Francisco Bay from the CALFED program. However, even where a sector of the Bay is included, the program's goals are too modest. For example, the tidal restoration goal for San Pablo Bay is 2,500 to 5,000 acres. Given the ecological importance of this region, and the potential for restoration, we believe that these goals are unjustifiably limited.

Also, although the EIS/R recommends seasonal wetlands restoration in the Suisun Marsh area, the EIS/R does not contain any goals regarding the restoration of seasonal wetlands in the San Pablo Bay area. Save the Bay is developing restoration opportunities here, which could include improved management for wildlife on farmed Baylands.

We recommend that the EIS/R be revised to include a San Pablo Bay tidal habitat restoration goal of 10,000 acres and a seasonal wetlands enhancement goal of at least another 10,000 acres.

3. The EIS/R's Delta Restoration Goals are Inadequate.

Despite the discussion of the importance of tidal habitat in the Western Delta, the EIS/R recommends the restoration of only 2,500 acres of tidal habitat in the Central and West Delta units. We believe that a more extensive restoration of habitat in this area is necessary for the success of the program. As we have stated elsewhere, we also believe that there are potential strategies available to restore subsided Central and West Delta islands to tidal habitat elevations. We believe that more extensive restoration throughout Delta, and upstream, will be required to achieve the goals of CALFED.

We recommend that CALFED dramatically increase its restoration goals for the Delta and upstream and further recommend that the EIS/R analyze the adequacy of the proposed habitat restoration program to achieve CALFED's ecosystem goals.

4. The EIS/R Does Not Evaluate the Cost-Effectiveness of Alternative Strategies to Provide Essential Additional Environmental Water.

The Implementation Strategy appendix states that CALFED assumes that new storage north of the Delta would be used jointly for ecosystem and water supply purposes (and possibly funded as an ecosystem restoration activity) (p. 31). However, just as the EIS/R fails to analyze the cost-effectiveness of alternative strategies to provide increased water supply reliability (see below), the EIS/R also fails to analyze the cost-effectiveness of alternative strategies to provide increased water for the environment required to meet CALFED's environmental objectives.

Any new storage facilities should have a portion of their yield dedicated to environmental mitigation. We oppose the use of any public funds for surface storage, even to provide environmental benefits, because we believe that constructing new surface storage would not be cost-effective.

We recommend that the ERPP and economic analysis regarding water supply also discuss the cost-effectiveness of alternative environmental water supply strategies.

5. The ERPP is Not Adequate to Achieve the Goals of the CALFED Process.

The ERPP has been the subject of extensive discussions over the past several months. As included in the draft EIS/R, we believe that the ERPP is inadequate to achieve CALFED's ecosystem goals, or possibly, even to mitigate for the ongoing impacts of the operation of existing water projects. However, we strongly endorse the components of the strategic plan (Developing a Strategic Plan appendix, p. 5) to develop a more adequate, scientifically sound, effective and adaptive ERPP.

We encourage CALFED to aggressively pursue the components of the strategic plan and to revise the EIS/R accordingly.

I. Water Use Efficiency Program

1. The EIS/R Fails to Adequately Analyze the Potential Benefits of Increased Water Efficiency.

We have elsewhere recommended the development of a soft path alternative which analyzes the potential of an aggressive program to increase the efficiency of the use of currently developed water supplies. The water use efficiency analysis relies heavily on DWR's draft Bulletin 160-98. We believe that the document, and the draft EIS/R, are fatally flawed with regard to:

- the role of economics in promoting efficient use.
- current and protected water use;
- conservation and reclamation potential in the urban community;
- conservation, crop changes, land retirement and other water management;
- opportunities for the agricultural community;
- the potential of water transfers.

With regard to transfers in particular, the EIS/R fails to analyze current and potential benefits for the agricultural community. For example, the Westlands Water District has used the market extensively to provide increased water supply reliability. In addition, from 1993 to 1997, the Bureau of Reclamation has approved 1.4 million acre feet of transfers within the CVP service area, pursuant to Section 3405(a) of the CVPIA. Finally, south of Delta agricultural users are currently establishing an electronic market to facilitate water marketing among water districts. Such transfers increase water supply reliability with no change in Delta exports, and at a cost far lower than new surface storage.

We recommend that the EIS/R be revised to provide a complete analysis of the potential for transfers to benefit agricultural and urban users, without increasing depletions from the environment.

2. The EIS/R Fails to Analyze the Potential Benefits of a Well-Constructed Land Retirement Program.

A previous CALFED analysis has revealed potentially significant and cost-effective water supply benefits from an ambitious land retirement programs. The EIS/R, however, fails to analyze a full range of land retirement opportunities. This strategy should be included and analyzed as a part of a water supply reliability option. Such willing seller programs are currently being used to the benefit of water users and the environment in other areas within this region of the Bureau of Reclamation (e.g. the Newlands Project).

CALFED has stated that land retirement has been excluded because it violates CALFED's solution principles with regard to redirected impacts. If CALFED believes that such redirected impacts are unacceptable, then surely the additional water diversions contemplated by each of the alternatives in the EIS/R would represent a similar redirected impact, which should likewise be excluded.

We recommend that the EIS/R be revised to include a complete analysis of all of the potential benefits (e.g. water quality, habitat and water supply) of an ambitious, well-designed, willing seller land retirement program.

J. Water Quality Program

1. The Water Quality Analysis Fails to Identify Adequate Strategies to Protect Environmental Values.

he EIS/R fails to analyze a ıll range of land retirement pportunities.

The EIS/R acknowledges that water quality problems currently impair beneficial uses, including environmental values. However, the EIS/R fails to identify specific actions to improve water quality for the benefit of drinking water and environmental values. In contrast with the ERPP (which we do not believe is currently adequate), the water quality program contains far less detail with regarding to current impairment, the primary causes of impairment and effective strategies for remediation.

We recommend that the EIS/R be revised to provide an adequate analysis of and comprehensive strategies to address water quality problems.

2. The Water Quality Analysis Fails to Evaluate Adequately the Technical Feasibility of a Full Range of Strategies to Provide Adequate Drinking Water Quality.

The water quality appendix identifies the relocation of water supply intakes in the Delta (e.g. construction of a Peripheral Canal) as one of only two methods to reduce impairment of drinking water quality (Water Quality appendix, p. 25). However, the EIS/R does not contain an adequate discussion of the potential for other strategies to contribute to protection of drinking water quality.

Other such strategies include:

- Trading Delta water for other South of Delta water sources (e.g. for water from the Friant Unit of the CVP);
- Blending Delta water with other water sources, a strategy which is available to nearly all areas which use Delta water for drinking water;
- The potential effectiveness of advanced water treatment technologies;
- Likely improvements in water treatment programs in the no action alternative;
- The drinking water quality benefits from a more ambitious water quality program and ecosystem restoration program (e.g. wetlands, floodplain and meander belt restoration);
- The water quality benefits from decreased Delta diversions and increased outflow at sensitive times of the year.

Regarding the latter, the EIS/R should explore possible linkages between increased flows to provide for ecosystem restoration and flows which could provide for decreased seawater intrusion to provide water quality benefits. Such increased Delta outflows could be made possible through environmental water purchase programs and the aggressive water conservation and water management alternative we have discussed elsewhere.

We recommend that the EIS/R be revised to contain an adequate analysis of a full range of strategies to provide high quality drinking water.

3. The EIS/R does not adequately analyze the water quality relationship between increased storage and increased Delta diversions.

The EIS/R states that an increase in storage could have a beneficial impact on export water quality (p. 6.1-57). However, the EIS/R does not discuss whether changes in operational plans or applicable standards (e.g. E:I ratios, x2 standards, export pumping limits) would reduce or eliminate these potential benefits.

Further, although the EIS/R states that increased storage, coupled with increased diversions, could result in increased water quality, it does not explore whether decreased diversions or increased releases from existing storage could achieve the same result.

We recommend that the EIS/R be revised to analyze adequately the water quality relationship between storage and Delta exports.

4. The EIS/R does not evaluate the relative economic and environmental advantages of alternative strategies to ensure high quality drinking water.

Once CALFED prepares the above recommended analysis of the technical feasibility of alternative strategies regarding drinking water quality, the document should be revised to include an analysis of the cost effectiveness and environmental impacts and benefits of different strategies.

5. The EIS/R does not contain an adequate discussion of possible future drinking water standards.

Some urban water districts have argued that a Peripheral Canal is needed to meet future water quality standards. The EIS/R does not provide an adequate analysis regarding possible future standards or a clear statement from responsible state and federal agencies (e.g. EPA and the SWRCB) regarding these standards.

K. Affected Environment

The "Affected Environment" analysis in the draft EIS/R is wholly deficient and fails entirely to meet the standard for a programmatic document. For example, notwithstanding the centrality of the aquatic resources of the Bay-Delta Estuary to the entire program, the draft EIS/R commits a single paragraph to a description of the historic fisheries in the Delta region – even this small effort fails to convey any information relevant to the historic fisheries in this region. The entire discussion of both "historic" and "existing" fisheries and aquatic resources conditions is less than five pages of text. Incredibly, the draft makes no attempt to identify important fish and other aquatic species in the Affected Environment sections, or to provide a programmatic level review of their historic distribution and abundance levels. The draft also fails to identify the amount and distribution of historic tidal or seasonal wetlands in the Bay and Delta regions, or to desibe their ecological functions. The same deficiency is repeated over and over again throughout the Affected Environment sections of the draft EIS/R.

In short, CALFED appears to have made an extraordinarily limited effort to provide the public and decison makers with meaningful information about the biological or physical resources at the heart of its program. (To the extent that this information is buried in "technical reports" that are available at only a limited number of repositories around the state, CALFED cannot claim to have fulfilled its obligations to disclose this information to the public.) The deficiencies in this analysis fall into three categories: (1) the time frame for describing the affected environment is too limited; (2) the level of analysis and information provided is grossly circumscribed; and (3) the species and habitat types reviewed in the EIS/R cannot be ascertained.

1. Time frame for Describing the Affected Environment Too Circumscribed

CALFED has included two time frames in the draft EIS/R to establish baseline conditions for the resources at issue; a "historic perspective" and "existing conditions." Given the degradation of biological and physical resources over time, we agree that a historic time frame is appropriate in addition to an attempt to capture current conditions. Because one of the central purposes of the CALFED program is to restore and rehabilitate the Bay-Delta ecosystem, it is essential that the baseline "affected environment" analysis provide decision makers and the public with a clear view of the historic abundance of aquatic and other species, the types, functions and distributions of important types of habitats that supported such species, and an overall perspective on historic ecosystem functions and processes. The EIS/R fails to do so, however. The "historic perspective" sections are far too cursory even for a programmatic document and do not clearly identify the time frame at issue. Moreover, it is not clear that CALFED is employing the historic perspective as providing a baseline against which environmental impacts will be measured.

The Affected Environment sections fail to provide a sufficient level of information about the natural resources most at issue.

To the contrary (as discussed below), the environmental impact analysis appears to be based exclusively on a comparison with the current – highly degraded – state of the natural environment. This is unacceptable in a program of this nature and is likely to result in a skewed analysis of program impacts. For example, in addition to asking whether the ERP will benefit the existing depleted resources of the Bay, the Estuary and most of their inhabitants, the CALFED program must also consider the level of benefits provided in comparison to the historic conditions that prevailed in these regions. Is the measure of success small improvements from today's depleted conditions? Or is it getting close to a return to historic functions and processes?

Obviously it is not our contention that historic conditions must be fully recreated – it is our contention that CALFED is obliged to restore the natural functions and processes of the Bay-Delta ecosystem to the maximum extent possible. This cannot be accomplished without a clear picture of what those conditions were.

> *We recommend that the EIS/R be revised to provide clear and complete information regarding the historic condition of Bay-Delta fishes, wetlands and other biological and physical resources in the Affected Environment sections of the EIS/R. In making this recommendation we are mindful that this is a programmatic level review and we are confident that CALFED can provide the public and decision makers with a programmatic level review of historic conditions. The current draft does not meet this test.*

2. Level of Description of Affected Environment Fatally Flawed

As discussed above, even setting aside the issue of the time frame for the appropriate environmental baseline, the Affected Environment sections fail to provide a sufficient level of information about the natural resources most at issue. There is no way to conduct a reasoned analysis of the environmental impacts of the alternatives given the baseline information provided in the draft EIS/R.

We recommend that the draft EIS/R be revised to provide the public and decision-makers with sufficient information regarding the environmental baseline that CALFED is using in its analysis of the environmental impacts of the alternatives under review.

3. Species and Habitat Types At Issue in EIS/R Not Ascertainable

The EIS/R is vague in its description of the Bay-Delta's natural resources. In a typical example, the Affected Environment section of vegetation and wildlife fails to identify vegetation at all but refers only to "plants," even when discussing special status species. Similarly, the discussion of historic and current conditions fails in general to identify fish or aquatic species in the Bay-Delta.

We recommend that the draft EIS/R be revised to provide clear descriptions of historic and current conditions of a reasonable range of specific plant, animal amphibian and other species.

In making this recommendation we are mindful that this is a programmatic level review. It is clear that CALFED has access to programmatic level information about specific species given its conclusions about the impacts the alternatives are likely to have on individual species. the public and decision-makers cannot assess the adequacy of the analysis - or the merits of CALFED's conclusions - without clear baseline information about the species at issue.

L. Impact Analysis of Alternatives Under Review

1. Failure to Disclose Technical Review

A major deficiency in the EIS/R and its supporting technical appendices is the near-total absence of technical information supporting CALFED's conclusions about the potential impacts of the programmatic alternatives under review. The draft EIS/R states that CALFED staff and consultants did prepare reports "analyzing and describing programmatic changes that could result from implementing CALFED program alternatives." However, this basic analysis was not made available to the public or decision-makers. This is entirely unacceptable. As discussed above, NEPA and CEQA establish basic standards for the adequacy of even programmatic documents. These standards at the very least require CALFED to disclose its review of "programmatic changes" expected to result from the alternatives. This is the heart and essence of CEQA and NEPA.

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It is in no way sufficient to point the public and decision-makers to the CALFED offices or "public repositories" to dig up basic information. Obviously, no full review of such reports can take place unless they are part of the EIS package provided to the public. Even a brief review of the impact analysis sections reveals the extreme disadvantage the public and decision-makers suffer in reviewing the draft EIS/R; these sections consist largely of cursory conclusions regarding program impacts with virtually no analysis or discussion of the support or basis for such conclusions.

We recommend that the EIS/R be substantially revised to include CALFED's analysis and descriptions of program impacts that could result from implementing CALFED Program alternatives, as well as the assumptions, data and other documentation supporting the impact conclusions in the EIS/R. In making this recommendation we are mindful that this is a programmatic level review. Nevertheless, the NEPA and CEQA requirements for adequate technical information and full public disclosure are not suspended for programmatic EISs and EIRs.

2. Impact Analysis Re: Fisheries and Aquatic Ecosystems Inadequate

The CALFED Program is a massive undertaking, proposing to fundamentally alter the water management system for most of the state and to rehabilitate dozens of jeopardized species over an ecosystem covering thousands of miles. Yet the analysis of impacts to fisheries and aquatic resources is extremely limited and fails to meet the information and disclosure standard for a programmatic document. As drafted, it cannot serve as the basis for decision regarding a programmatic approach to a water supply alternative or an ecosystem restoration program.

The fish impacts section (p. 7.1-32 to -45) consists primarily of unsupported conclusions about program impacts. The information that is furnished is for the most part extremely sketchy and limited. For example, we are told that under Alternative 2, flow from the new channel would adversely affect flow patterns in the east and central Delta; we are not told what impact this would have on any fish or other aquatic species. For example, in the table on page 7.2-1, the DEIS/R states that the no action alternative and alternative 1 would have minimal impacts. However, the no action alternative and all alternatives assume increases in diversions. These increased diversions would likely have significant impacts on fish and wildlife, particularly fish species listed and proposed for listing under the state and federal ESAs.

The analysis of impacts to fisheries and aquatic resources is extremely limited and fails to meet the information and disclosure standard for a programmatic document

Alternatives 2 and 3 would result in increased diversions from the Sacramento River. The EIS/R does not adequately analyze potential impacts from these alternatives on up and downstream migrating salmonids and other fish on the Sacramento River, particularly those listed or proposed for listing under the State and Federal ESAs. The EIS/R should examine the efficacy of implementing an alternative designed to cause further impacts to the Sacramento River, in order to reduce pressure on the San Joaquin River, particularly without a strategy to put water back into the mainstem of the San Joaquin River below Friant Dam.

We recommend that the EIS/R be revised to evaluate potential impacts to salmonids on the Sacramento River. We further recommend that the EIS/R compare these impacts with the relative benefits, if any, for fish in the Delta and on the San Joaquin River.

3. Impact Criteria Re: Water Supply and Management Improper

First, economic impacts on consumptive water users do not constitute "environmental impacts" for purposes of NEPA or CEQA. While such economic impacts should be identified and analyzed in the CALFED program, it is improper to conflate them with the environmental impacts of the program.

Second, the draft defines any impact on water supply as a "significant adverse impact" for NEPA/CEQA purposes. This semantic device may restrict any environmental restoration program to measures that can be implemented with no effect on water supply. This may or may not be an appropriate policy choice at the end of the process. But it is clearly impermissible to stack the deck with this type of bias in the context of the environmental review.

Finally, the significance criterion for the water supply analysis runs counter to CALFED's parity principle. While the significance of impacts to water supply is defined in terms of an alternative's ability to achieve the CALFED program objectives, the significance of impacts to the environment is defined more cautiously. In contrast with the broad standard for finding that an alternative would have a significant adverse effect on water supply, project impacts on fish are not "significant" unless it could be shown that the project would contribute to further reductions in species abundance and distribution.

> *We recommend that the draft EIS/R be revised to ensure parity among the significance criteria for the program elements by making one of two changes: Either (1) the criterion for water supply should be changed to match that in place for fisheries. For example: "Impacts are significant when project actions cause or contribute to substantial short or long-term disruptions in water supply that potentially reduce the economic viability of the affected interest over the long-term;" or (2) the criterion for fisheries should be changed to match that in place for water supply reliability. For example: "The significance of effects of program actions on fisheries is evaluated with respect to the CALFED primary ecosystem restoration objective of improving and increasing aquatic and terrestrial habitats, or would worsen ecological functions, are deemed to have a significant adverse impact on fisheries or other aquatic resources."*

M. Economic Analysis

1. The EIS/R Fails to Include Adequate Economic Analysis of Alternative Water Supply Reliability Strategies

The EIS/R (and the CALFED program) is segmented into a number of sections that address reliability issues. These sections include storage and conveyance, water use efficiency, and water transfers. These represent alternative strategies to increase water supply reliability for water users. The EIS/R dismisses other reliability strategies such as groundwater metering, regulation, and land retirement.

As a result of this segmentation and exclusion, the EIS/R fails to perform an analysis comparing a full range of water supply reliability strategies to determine the relative operational, economic

and environmental costs and benefits of each. For example, the discussion of the storage and conveyance refinement process indicates that CALFED developed preliminary cost estimates, but does not reveal any strategy to compare these costs with the costs of other potential approaches to water supply reliability. By failing to perform such an analysis, the EIS/R is likely to lead CALFED to a "smorgasbord" approach which includes some of each strategy -- transfers, storage and water user efficiency.

However, a sound economic analysis could produce a better balance of strategies. It might also reveal, for example, whether new surface storage, which is featured prominently in all three alternatives, is cost effective or not and whether it should be included in the preferred alternative. Without such an economic analysis, CALFED cannot develop a program with water supply benefits which optimally balances operational, environmental and economic benefits. *Attached is a more detailed discussion of the shortcomings of the EIS/R with regard to economic analysis.*

> *We recommend that the EIS/R be revised to include a thorough analysis of the economic costs and benefits of a full range of alternative strategies to provide increased water supply reliability.*

2. The Analysis of Impacts on Agricultural Economics is Inadequate.

The EIS/R states, in the discussion of agricultural economics (p.8.1-5), that the alternatives "would potentially increase the amount of water available for agricultural production in some regions." However, the impacts on agricultural economics are determined by far more than the availability of water. In particular, the EIS/R fails to discuss the impacts which the alternatives would have on the price of water – a factor of great importance to agricultural water users in the Central Valley.

At a Congressional hearing on April 15, 1998, agricultural representatives testified that they were unable (or at least unwilling) to pay water rates in the range of $30 per acre foot. According to the Least-Cost Yield Study, prepared by the Department of Interior pursuant to the Central Valley Project Improvement Act, the cost of new water developed through new surface storage projects (one of the strategies featured most prominently in the DIES/R alternatives) ranges from $300 to $3,000 per acre foot.

Therefore, CALFED could increase water supplies for agriculture, but agricultural water users would be unable to afford this water, resulting in no benefits to the agricultural economy. Alternatively, if, through CALFED assurances and financing packages, agricultural interests were compelled to pay for this water, these CALFED alternatives could result in significant negative impacts on the agricultural economy.

By failing to analyze the cost of water developed through alternative water supply strategies and by failing to develop a financing package, the document fails to present adequate information to perform an analysis of impacts to the agricultural economy.

> *We recommend that the DEIS/R be revised to include an economic and financing analysis adequate to determine potential benefits and impacts to the agricultural economy.*

3. EIS/R Fails to Analyze the Potential Environmental Justice Benefits of a Soft Path Alternative.

The EIS/R indicates that the actions considered in the EIS/R could have a "disproportionate impact on minority and low income populations" (P.8.10-1). However, a soft path could offer benefits to some minority and poor communities. In particular, the irrigation and crop changes which could result from improved water management could result in increased employment in agriculture. In addition, programs working with inner city communities (e.g. toilet retrofit programs), particularly in Southern California, have revealed significant economic benefits for poor communities from conservation programs.

The CALFED alternatives which rely on increased storage and conveyance could increase water rates in inner city communities for the construction of facilities far away from these areas. On the other hand, the soft path alternative which we have advocated, could offer the dual benefits of lower water rates and increased employment in inner city communities.

We recommend that the EIS/R be revised to include an analysis of the possible environmental justice benefits of a soft path alternative.

N. Impact Analysis Re: Hydrodynamics and Riverine Hydraulics Inadequate

The impact of all of the CALFED alternatives would be to increase the effects of water development on the hydrology of the system, particularly: increasing depletions from the system; and carving peaks off of the hydrograph through expanded storage. These actions have, in the past, caused serious impacts on Central Valley rivers, the Delta and the Bay. The impacts on South San Francisco Bay, regarding stratification, primary productivity and water quality, are well known. However, the EIS/R incorrectly finds that the impacts of most of these modifications are not substantial (p. 6.1-41-54)

We recommend that the EIS/R address the impacts of increased hydrodynamic modifications of the entire system (particularly San Francisco Bay) and examine operating criteria that could avoid or reduce these impacts (e.g. "protecting" some peaks in the hydrograph).

O. Impact Analysis Re: Groundwater Resources Inadequate

The discussion of current conditions finds serious problems with regard to groundwater resources, including land subsidence, depressed groundwater levels and declining water quality. The EIS/R then finds that the CALFED program could result in "possible reduction or reversal of the adverse effects of past overdrafting of groundwater, such as land subsidence and water quality degradation."

The State Water Project and Central Valley Project were both constructed, in part, to address groundwater problems in the Central Valley. Groundwater problems in the Central Valley (although inadequately documented) are due not to a lack of surface water development, but to the lack of adequate metering, management and regulation.

We recommend that the EIS/R be revised to evaluate the extent to which the CVP and SWP succeeded in solving groundwater problems in the Central Valley. The EIS/R should then evaluate the potential of the CALFED program to address groundwater problems, given the current lack of regulatory controls. Finally, we recommend that the EIS/R be revised to evaluate the adequacy of existing information regarding groundwater (e.g. metering) and the extent to which the adequacy of this information affects the ability to evaluate the actual extent of current groundwater problems.

P. Financing Issues

1. The EIS/R Fails to Include a Financing Strategy

Financing is a key not simply to the implementation of a preferred alternative, but to the contents of that alternative. The degree to which water users must pay for program elements will dramatically influence their recommendations to CALFED regarding acceptable strategies. For example, despite CALFED's general support for a benefits-based cost allocation formula, some water users continue to advocate expanded surface storage, to be financed by the public, and to be managed to provide water supply benefits for water users. If CALFED develops a clear, specific financing strategy, it will influence the position of these stakeholders regarding storage and other water supply reliability strategies. Although the EIS/R discusses alternative financing strategies in the Implementation Strategy appendix, it does not provide the specific financing proposal needed to shape the preferred alternative.

CALFED's document does not analyze the possibility that the CALFED program could create a significant stranded assets problem.

We recommend that the EIS/R be revised to include a detailed, specific financing strategy and that financing be incorporated early into the development of the preferred alternative. We further recommend that this strategy include significant water user contributions to ecosystem restoration, in recognition of currently unmet environmental mitigation obligations.

2. The EIS/R Fails to Analyze the Risk of Creating Stranded Assets

As discussed above, the EIS/R fails to prepare an adequate analysis of the cost effectiveness of alternative water supply strategies and fails to present a financing package. However, the EIS/R does assume some user contribution to the CALFED programs which could provide water supply benefits. As a result of these two failures, CALFED's document does not analyze the possibility that the CALFED program could create a significant stranded assets problem.

The energy field has been struggling with stranded assets issues for a decade. In that field, investments which the environmental community have long argued to be not cost-effective, have proven to be unwise. The responsibility for shouldering these bad investments can fall to rate payers, stockholders or the general public.

In the water supply area, we are already beginning to see the issue of stranded assets emerge. The San Diego County Water Authority is pursuing its proposed water transfer with the Imperial Irrigation District for a variety of reasons. In SDCWA's discussions regarding wheeling arrangements with the Metropolitan Water District, MWD has argued that the costs of the Eastside Reservoir and even the costs of a Bay-Delta solution, should be factored into wheeling costs. Such charges represent stranded costs.

CALFED can pursue one of two financing strategies if it opts for a water supply strategy which is not cost-effective. The first is to attempt to force such costs onto the public (which may well reject such attempts). The second is to force costs onto rate payers. If CALFED pursues the latter strategy, local water districts may seek alternative water supply strategies, thus creating a stranded costs problem. One other possible outcome is that a water supply wholesale agency, which would be obligated to pay a portion of the costs a CALFED preferred alternative, would discourage local water agencies from pursuing alternative water supply strategies which could be economically and/or environmentally preferable.

We recommend that the EIS/R be revised to contain a full analysis of the stranded asset risks of the CALFED preferred alternative.

Q. Inappropriate Assumptions

Save The Bay strongly objects to CALFED's decision to employ Bulletin 160-98's recent demand estimates as a basis for evaluating the program alternatives. This draft document is the subject of substantial criticism.

The comments submitted by members of the Environmental Water Caucus, including Save The Bay, on Bulletin 160-98 are hereby incorporated fully by reference. A copy of these comments has been previously provided to the CALFED Bay-Delta Program.

We recommend that CALFED prepare revised demand estimates for the EIS/R that are based on sound scientific assumptions and methodology. In the alternative, the EIS/R should be revised to provide a justification for using the demand figures in Bulletin 160-98 that responds to all of the points raised.

R. Project Alternatives

1. The EIS/R Fails to Analyze the Benefits, Impacts and Assurances Aspects of "Dual Conveyance"

One of the reasons CALFED is considering a "dual conveyance" Alternative 3 is to preserve the concept of the Delta common pool, which is intended, in part, to provide assurances regarding Delta environmental, water supply and water quality issues. However, the proposed operations plan for Alternative 3 includes low minimum Delta diversions through much of the year and no minimum Delta diversions in the Spring (Project Alternatives, p. 65). It is likely that

such low levels of Delta diversions would provide little or no real world assurances regarding Delta environmental, water supply and water quality issues.

We recommend that the document be revised to explore a full range of possible operations for an isolated facility, to explain the rationale for the proposed Delta diversion levels and to fully evaluate the benefits and impacts of the proposed operations plan, as well as the assurances implications of the proposed plan.

S. Environmental Impacts

1. The EIS/R Fails to Analyze the Potential Impacts of the Relaxation of the Export: Inflow Criteria on Fish and Wildlife.

The export: inflow criteria first developed in the Bay-Delta Accord were designed to provide protection for natural resources from the impacts of the diversion of water from the Delta. This document states in several places that alternative three could include the relaxation of these criteria, by artificially determining that exports through a Peripheral Canal (or isolated facility) would not be considered Delta exports. The document fails to discuss the potential impacts of this change.

We recommend that the EIS/R be revised to pursue one of two strategies:

1.) Include an assurances package which would prevent the relaxation of all relevant environmental protection criteria (including E/I ratios, x-2 criteria, etc.); or

2.) Include a full analysis, for each alternative, of the potential impacts of the relaxation of e/i ratios and of other standards such as x-2 on the environment, particularly on fish species listed and proposed for listing under the State and Federal ESAs.

2. The EIS/R Does Not Adequately Address Potential Impacts to Sacramento River Salmonids.

Alternatives 2 and 3 would result in increased diversions from the Sacramento River. The document does not adequately analyze potential impacts from these alternatives on up and down-stream migrating salmonids and other fish on the Sacramento River, particularly those listed or proposed for listing under the State and Federal ESAs. Save the Bay questions whether it would be a wise strategy to implement a preferred alternative designed to cause further impacts to the Sacramento River, in order to reduce pressure on the San Joaquin River, particularly without a strategy to put water back into the mainstem of the San Joaquin River below Friant Dam.

We recommend that the document be revised to evaluate potential impacts to salmonids on the Sacramento River. We further recommend that the document compare these impacts with the relative benefits, if any, for fish in the Delta and on the San Joaquin River.

3. The Analysis of Impacts on Groundwater Resources is Inadequate.

The discussion of current conditions finds serious problems with regard to groundwater resources, including land subsidence, depressed groundwater levels and declining water quality. The document then finds that the CALFED program could result in "possible reduction or reversal of the adverse effects of past overdrafting of groundwater, such as land subsidence and water quality degradation."

The State Water Project and Central Valley Project were both constructed, in part, to address groundwater problems in the Central Valley. Groundwater problems in the Central Valley (although inadequately documented) are due not to a lack of surface water development, but to the lack of adequate metering, management and regulation.

We recommend that the document be revised to evaluate the extent to which the CVP and SWP succeeded in solving groundwater problems in the Central Valley. The document should then evaluate the potential of the CALFED program to address groundwater problems, given the current lack of regulatory controls. Finally, we recommend that the document be revised to evaluate the adequacy of existing information regarding groundwater (e.g. metering) and the extent to which the adequacy of this information affects the ability to evaluate the actual extent of current groundwater problems.

4. The document does not adequately evaluate the potential impacts from hydrodynamic and riverine hydraulic modifications.

The impact of all of the CALFED alternatives would be to increase the effects of water development on the hydrology of the system, particularly: increasing depletions from the system; and carving peaks off of the hydrograph through expanded storage. These actions have, in the past, caused serious impacts on Central Valley rivers, the Delta and the Bay. The impacts on South San Francisco Bay, regarding stratification, primary productivity and water quality, are well known. However, the document incorrectly finds that the impacts of most of these modifications are not substantial (p. 6.1-41-54)

We recommend that the document address the impacts of increased hydrodynamic modifications of the entire system (particularly San Francisco Bay) and discuss whether there are operating criteria which could avoid or reduce these impacts (e.g. "protecting" some peaks in the hydrograph).

T. Ecosystem Restoration Program Plan

1. The Document Does Not Acknowledge Key Related Programs for San Francisco Bay.

The discussion for the Suisun Marsh/North San Francisco Bay Ecological Zone (ERPP, Vol. II, p. 99) does not acknowledge important related restoration programs: the Partnership for the San Pablo Baylands and the San Francisco Bay Joint Venture. Save San Francisco Bay Association, which coordinates the Partnership for the San Pablo Baylands, is currently preparing a plan for the stewardship of this area. This plan, which will be released in July, was developed in cooperation with agencies and local landowners and can provide a model for improved cooperation within CALFED and for strengthening of the ERPP. We believe that this plan will provide recommendations which should be included in the CALFED ERPP and preferred alternative.

2. The ERPP's Restoration Goals for San Pablo Bay Are Too Modest.

We have previously indicated our opposition to the exclusion of portions of San Francisco Bay from the CALFED program. However, even where the Bay is included, the program's goals are too modest. For example, the tidal restoration goal for San Pablo Bay is 2,500 to 5,000 acres. Given the ecological importance of this region, and the potential for restoration, we believe that these goals are unjustifiably small.

Also, although the document recommends seasonal wetlands restoration in the Suisun Marsh area, the document does not contain any goals regarding the restoration of seasonal wetlands in the San Pablo Bay area. Save the Bay is developing restoration opportunities here, which could include improved management for wildlife on farmed Baylands.

We recommend that the document be revised to include a San Pablo Bay tidal habitat restoration goal of restoring 10,000 acres of seasonal wetlands

3. The Document's Delta Restoration Goals are Inadequate.

For example, despite the discussion of the importance of tidal habitat in the Western Delta, the document recommends the restoration of only 2,500 acres of tidal habitat in the Central and West Delta units. We believe that a more extensive restoration of habitat in this area is necessary for the success of the program. As we have stated elsewhere, we also believe that there are potential strategies available to restore subsided Central and West Delta islands to tidal habitat elevations. We believe that more extensive restoration throughout Delta, and upstream, will be required to achieve the goals of CALFED.

We recommend that CALFED dramatically increase its restoration goals for the Delta and upstream and further recommend that the document analyze the adequacy of the proposed habitat restoration program to achieve CALFED's ecosystem goals.

4. The Document Does Not Evaluate the Cost-Effectiveness of Alternative Strategies to Provide Essential Additional Environmental Water.

The Implementation Strategy appendix states that CALFED assumes that new storage north of the Delta would be used jointly for ecosystem and water supply purposes (and possibly funded as an ecosystem restoration activity) (p. 31). However, just as the document fails to analyze the cost effectiveness of alternative strategies to provide increased water supply reliability, the document also does not analyze the cost effectiveness of alternative strategies to provide increased water for the environment required to meet CALFED's environmental objectives. Save the Bay believes that any new storage should have a portion of its yield dedicated as environmental mitigation. However, we oppose the use of any public funds for surface storage, even to provide environmental benefits, because we believe that constructing new surface storage for the environment, even if it could and would be operated to provide environmental benefits (regarding which we are highly skeptical), would not be a cost effective strategy.

We recommend that the ERPP and economic analysis regarding water supply also discuss the cost-effectiveness of alternative environmental water supply strategies.

5. The ERPP is Not Adequate to Achieve the Goals of the CALFED Process.

The ERPP has been the subject of extensive discussions over the past several months. As included in the draft EIS/R, we believe that the ERPP is inadequate to achieve CALFED's ecosystem goals, or possibly, even to mitigate for the ongoing impacts of the operation of existing water projects. However, we strongly endorse the components of the strategic plan (Developing a Strategic Plan appendix, p. 5) to develop a more adequate, scientifically sound, effective and adaptive ERPP.

We encourage CALFED to aggressively pursue the components of the strategic plan and to revise the EIS/R accordingly.

U. Long Term Management Strategy Linkages

1. The EIS/R Fails to Evaluate the Possible Linkages Between the CALFED Program and the Long Term Management Strategy Regarding Dredging in San Francisco Bay.

The Sonoma Bayland program has demonstrated potential ecosystem benefits from beneficial reuse of clean dredged materials. Such beneficial reuse opportunities are currently being investigated regarding Hamilton Field. However, neither CALFED nor the LTMS have adequately evaluated the potential use of clean dredged materials in the Delta for habitat restoration or levee maintenance.

The Levee Protection Plan document states that it "assumes that local borrow is readily available on the islands and that beneficial reuse of dredged materials will be maximized" (p. G-2). The document, however, does not evaluate obstacles to using clean dredged materials from the Bay, the costs of such materials, or the potential for funding partnerships with the dredging community. The salinity of dredged materials from the Bay has been cited as a major obstacle to its use in the Delta. We believe that there are a variety of strategies which could be available to manage salinity issues. The document also fails to present or analyze these strategies.

The EIS/R does not adequately evaluate the potential benefits of dredged material reuse in the Delta for habitat restoration. The document states that dredged material could be used to reverse subsidence and restore tidal wetlands and other habitats (ERPP, Vol. 1, p. 14, 81 and 286; V. II, p. 59). However the document then dismisses this potential with the statement that "Restoration efforts should focus on those leveed lands that have not yet been subjected to severe subsidence" (ERPP, Vol. 1, p. 81).

The EIS/R does not evaluate the relative potential value of habitat restoration in areas where subsidence is a key obstacle (e.g. the central and western Delta) in comparison with habitat restoration in currently unsubsided areas. The ERPP could, therefore, be failing to consider a valuable tool to restore habitat in the Western Delta to provide key fisheries habitat in dry years, downstream from the major influence of Delta diversions.

Finally, the EIS/R indicates that the Department of Water Resources is one of the most significant landowners in the Western Delta (ERPP, Vol. II, p. 24). Given that Delta landowners have called for restoration to be focused on publicly owned lands, dredged material reuse could be an important tool to increase support for the ERPP.

We recommend that the DEIS/R be revised to evaluate the potential reuse of clean dredged materials from the Bay for habitat restoration and levee maintenance. The document should evaluate the extent to which such reuse could: make possible particularly valuable habitat restoration; manage potential salinity impacts from the use of Bay dredged materials; create funding partnership opportunities with Bay dredgers; complement (or compete with) the restoration of Hamilton Field and other beneficial reuse opportunities in the Bay.

V. Levee Protection Plan

1. The Long-Term Levee Protection Plan document Does Not Adequately Explain the Levee Program.

The Levee Program Appendix contains little information regarding the actual program which is proposed to be undertaken. The document does not contain adequate information regarding:

- which of the Delta's levees would be repaired, replaced or moved; the environmental impacts of this program;
- the cost-effectiveness of this program;
- the trade-offs between restoration and levee maintenance;
- how this program would complement, or interfere with, the ERPP; or
- the availability of needed borrow or dredged materials (see above).

We recommend that the EIS/R be revised to provide adequate information regarding these issues.

W. Water Quality

1. The Water Quality Analysis Fails to Identify Adequate Strategies to Protect Environmental Values.

The document acknowledges that water quality problems currently impair beneficial uses, including environmental values. However, the document fails to identify specific actions to improve water quality for the benefit of drinking water and environmental values. In contrast

with the ERPP (which, as previously stated, we do not believe is currently adequate), the water quality program contains far less detail with regarding to current impairment, the primary causes of impairment and effective strategies for remediation.

We recommend that the EIS/R be revised to provide an adequate analysis of and comprehensive strategies to address water quality problems.

2. The Water Quality Analysis Fails to Evaluate Adequately the Technical Feasibility of a Full Range of Strategies to Provide Adequate Drinking Water Quality.

The water quality document identifies the relocation of water supply intakes in the Delta (e.g. construction of a Peripheral Canal) as one of only two methods to reduce impairment of drinking water quality (Water Quality appendix, p. 25). However, the document does not contain an adequate discussion of the potential for other strategies to contribute to protective drinking water quality. Other such strategies include:

- Trading Delta water for other South of Delta water sources (e.g. for water from the Friant Unit of the CVP);
- Blending Delta water with other water sources, a strategy which is available to nearly all areas which use Delta water for drinking water;
- The potential effectiveness of advanced water treatment technologies;
- Likely improvements in water treatment programs in the no action alternative;
- The drinking water quality benefits from a more ambitious water quality program and ecosystem restoration program (e.g. wetlands, floodplain and meander belt restoration);
- The water quality benefits from decreased Delta diversions and increased outflow at sensitive times of the year.

Regarding the latter, the document should explore possible linkages between increased flows to provide for ecosystem restoration and flows which could provide for decreased seawater intrusion to provide water quality benefits. Such increased Delta outflows could be made possible through environmental water purchase programs and the aggressive water conservation and water management alternative we have discussed elsewhere.

We recommend that the document be revised to contain an adequate analysis of a full range of strategies to provide high quality drinking water.

3. The EIS/R does not adequately analyze the water quality relationship between increased storage and increased Delta diversions.

The EIR/R states that an increase in storage could have a beneficial impact on export water quality (p. 6.1-57). However, the document does not discuss whether changes in operational plans or applicable standards (e.g. E:I ratios, x2 standards, export pumping limits) would reduce or eliminate these potential benefits.

Further, although the EIS/R states that increased storage, coupled with increased diversions, could result in increased water quality, it does not explore whether decreased diversions or increased releases from existing storage could achieve the same result.

We recommend that the EIS/R be revised to analyze adequately the water quality relationship between storage and Delta exports.

4. The document does not evaluate the relative economic and environmental advantages of alternative strategies to provide high quality drinking water.

Once CALFED prepares the above recommended analysis of the technical feasibility of alternative strategies regarding drinking water quality, the document should be revised to include an analysis of the cost effectiveness and environmental impacts and benefits of different strategies.

5. The document does not contain an adequate discussion of possible future drinking water standards.

Some urban water districts have argued that a Peripheral Canal is needed to meet future water quality standards. The document does not provide an adequate analysis regarding possible future standards or a clear statement from responsible state and federal agencies (e.g. EPA and the SWRCB) regarding these standards.

Y. Water Use Efficiency

1. The EIS/R Fails to Adequately Analyze the Potential Benefits of Increased Water Efficiency.

We have elsewhere recommended the development of a soft path alternative which analyzes the potential of an aggressive program to increase the efficiency of the use of currently developed water supplies. The water use efficiency document relies almost exclusively on DWR's draft Bulletin 160-98, we believe that that document, and therefore, the EIS/R, is fatally flawed with regard to:

- the role of economics in promoting efficient use;
- current and protected water use;
- conservation and reclamation potential in the urban community;
- conservation, crop changes, land retirement and other water management opportunities for the agricultural community;
- the potential of water transfers.

With regard to transfers in particular, the EIS/R fails to analyze current and potential benefits for the agricultural community. For example, the Westlands Water District has used the market extensively to provide increased water supply reliability. In addition, from 1993 to 1997, the Bureau of Reclamation has approved 1.4 million acre feet of transfers within the CVP service area, pursuant to section 3405(a) of the CVPIA. Finally, South of Delta agricultural users are

currently establishing an electronic market to facilitate water marketing among water districts. Such transfers increase water supply reliability with no change in Delta exports, and at a cost far lower than new surface storage.

We recommend that the EIS/R be revised to provide a complete analysis of the potential for transfers to benefit agricultural and urban users, without increasing depletions from the environment.

2. The EIS/R Fails to Analyze the Potential Benefits of a Well-Constructed Land Retirement Program.

A previous CALFED analysis has revealed potentially significant and cost-effective water supply benefits from an ambitious land retirement program. The document, however, fails to analyze a full range of land retirement opportunities. As discussed above, this strategy should be included and analyzed as a water supply alternative. Such willing seller programs are currently being used to the benefit of water users and the environment in other areas within this region of the Bureau of Reclamation (e.g. the Newlands Project).

CALFED has stated that land retirement has been excluded because it violates CALFED's solution principles with regard to redirected impacts. If CALFED believes that such redirected impacts are unacceptable, then surely the additional water diversions contemplated by each of the alternatives in the document would represent a similar redirected impact, which should likewise be excluded.

We recommend that the document be revised to include a complete analysis of all of the potential benefits (e.g. water quality, habitat and water supply) of an ambitious, well-designed, willing seller land retirement program.

Part II: Assurances, Implementation Strategy and ESA Compliance issues

One of Save The Bay's major concerns about the CALFED process is how to ensure a meaningful level of restoration and recovery for the Bay-Delta ecosystem over the long-term. The draft EIS/R is enormously disappointing in this respect – very little in the volume of paper provided analyzes the many opportunities and avenues available to make this objective a reality. Part of the problem may be a surfeit of planning. The Implementation Strategy and the Conservation Strategy are all crafted to address different parts of this challenge. The effect, however, is a fragmentation of effort that is unlikely to achieve success.

A. Assurances/Implementation Strategy Technical Appendix

An assurances package is a basic element of the CALFED Program, like drinking water quality. The acceptability of other program elements, such as storage and conveyance and the restoration plan, will turn in part on the strength of the associated assurance mechanisms in the package. For example, a facility with no legal remedies or binding contracts associated with its operation is far less likely to pass muster than an adequately constrained facility. An ecosystem restoration program without long-term funding attached to it will fail to gain public confidence as well. For this reason, the assurance proposal cannot be prepared sequentially, after the substantive proposals have been completed.

Putting a program in place or on a schedule is not the equivalent of building into that program guarantees of performance.

The draft EIS/R defines assurances as "mechanisms necessary to assure that the solution will be implemented and operated as agreed." However, what it provides to the public and decision makers is instead an "implementation strategy" – an entirely different thing. Putting a program in place or on a schedule is not the equivalent of building into that program guarantees of performance. It is not difficult to imagine the ERPP being "implemented" with little ecosystem recovery actually occurring. Moreover, without a serious examination of assurance issues, the chances of successful implementation are minimal.

The draft EIS/R fails entirely to provide the public or decision makers with a sense of the options available to assure the program elements. The draft never asks the basic question: What do we need to do to ensure that the Ecosystem Restoration Program (or any other program) is fully implemented so as to achieve its substantive goals? The draft lists "tools," and "management structures," and "guidelines" for an assurance package, but it never sets forth the basic elements necessary to guarantee that the ecosystem restoration program will achieve its objectives.

For example, ecosystem restoration will not be achieved without a secure source of both water and funding. There is no discussion in the EIS/R of the alternatives available to achieve these assurances. The draft EIS/R fails as well to evaluate the potential environmental impacts asso-

ciated with different assurances approaches. For example, using water transfers to assure the water necessary for the restoration program could result in very different environmental impacts than the dedication of water through an environmental water right.

It is revealing that neither the EIS/R nor the technical appendices deal directly with assurances but instead approach this issue through the more limited question of how to "implement" the program. However, the Implementation Strategy fails to identify much less examine assurance issues but focuses instead on the "process" for obtaining public consensus. While consensus is laudable and important, the CALFED agencies are still obligated to provide full and clear information to the public about assurances issues regardless of the work group's progress. (Surprisingly, the draft EIS/R fails to mention the one assurance issue that enjoyed unanimous consensus among stakeholders: the notion that the Ecosystem Restoration Program should be implemented by a new entity.)

While we recognize that absolute guarantees may not be attainable under all circumstances, an assurance package should provide a high degree of confidence that the program's substantive goals will be met. The purpose of an assurance package should be to ensure program outcomes. As discussed below, in the case of the Ecosystem Restoration Program and the Conservation Strategy, this means that the assurances package should have as its objective achievement of the performance standards established for the restoration efforts.

Save The Bay recommends that the revised EIS/R examine the package of assurance mechanisms listed below for the ecosystem restoration component:

1. *Strong ERPP with measurable performance standards*
2. *Legal mandates to achieve performance standards*
3. *Institution dedicated to implementation with sufficient authority*
4. *Water*
5. *Funding*
6. *Enforcement of baseline environmental statutes*
7. *Physical constraints on new water developments*
8. *Controls on water project operations*
9. *Phasing/linkages of program elements*
10. *Remedies*

Some of the mechanisms listed above are touched upon in the draft, but not as part of a total approach to ensuring that the ecosystem restoration program is successful over time. There are alternative ways of addressing each of the categories above. For example, the revised draft should consider whether the most effective approach to guaranteeing the necessary water for ecosystem restoration would be (1) to allocate some specified amount of water to the environment in the nature of a water right; or (2) to provide the ecosystem restoration entity with sufficient funds to buy water as needed for the environment. Our specific recommendations on this list of assurance mechanisms is below.

1. Strong ERPP and Conservation Strategy with performance standards

We have provided extensive comments elsewhere on the merits of the ERP. For purposes of crafting an assurances package for the ecologic recovery programs, the first step must be an express understanding that the purpose and function of the assurances package is the achievement of the performance standards guiding the ERP and the Conservation Strategy (see below). This issue is not addressed in the Implementation Strategy or elsewhere in the draft. The draft should be revised accordingly.

We recommend that the EIS/R be revised to include an assurance proposal establishing attainment of the ERP performance standards as the express purpose of the assurance package.

2. Legal mandates to achieve performance standards

The provision of water for environmental initiatives is essential to ensuring that the ecosystem restoration program is implemented.

Assuming that adequate performance standards are adopted by the CALFED program, such standards will not be self-executing. Achieving these standards should be elevated to a legal mandate for whatever institution is tasked to implement the ecosystem restoration programs. This issue is not addressed in the Implementation Strategy or elsewhere in the draft. The draft should be revised accordingly.

We recommend that the EIS/R be revised to include an assurance package that makes attainment of the performance standards a legal responsibility of the implementing entity.

3. Institution dedicated to program implementation with sufficient authority

The draft acknowledges that "institutional arrangements" are a significant assurance issue but fails to examine the alternative institutional models available to ensure not only the ecosystem restoration program but the other program elements.

We recommend that the draft EIS/R be revised to provide the public and decisionmakers with clear information regarding the alternative institutional options available to assure the implementation of the ecosystem restoration and other program elements.

4. Environmental Water

The provision of water for environmental initiatives is essential to ensuring that the ecosystem restoration program is implemented. Nevertheless, the draft EIS/R fails to examine the

very difficult issue of how such water can be assured. Indeed, notwithstanding the strong concerns of various members of the environmental community, it is not even listed as among the "issues and concerns" identified in the draft. Moreover, environmental water rights, regulatory changes and other mechanisms for securing environmental water are not listed as assurance "tools."

The draft EIS/R should be revised to include a thorough discussions of the alternative means available to ensure adequate supplies of environmental water necessary to achieve implementation of the ecosystem restoration program, including the establishment of an environmental water right.

5. Funding

Questions about how to finance the CALFED solution are addressed at various times in the draft EIS/R. These issues differ fundamentally from the question of money as an assurance mechanism, particularly with regard to the ecosystem restoration program. However CALFED decides to finance the long-term solution, an entirely different question is: How will such funds be obtained in the long-term?

The ecosystem restoration program hingles almost entirely on the availability of large sums of money . . .

This is especially critical for the ecosystem restoration program which hinges almost entirely on the availability of large sums of money – both to conduct restoration and to buy water – over long periods of time. Yet the EIS/R fails to address the alternatives available for securing such resources. To the extent that the entire plan is contingent on the annual federal and/or state appropriation processes, there is nothing even remotely "assured" about the restoration program.

We recommend that the draft EIS/R should be revised to analyze funding scenarios for each of the program elements from an assurances perspective.

6. Enforcement of Baseline Environmental Statutes

The draft EIS/R ignores the question of baseline enforcement of existing environmental statutes and regulations. Maintenance of the regulatory baseline is a key assurance issue for the CALFED program; it has long been assumed that the minimal level of water, habitat and funding provided by the Clean Water Act standards, ESA protections and CVPIA implementation are the foundation of the CALFED program. Without this baseline, the Program has that much further to go in achieving its restoration objectives. Moreover, as this baseline and the assurances it was intended to provide has been corroded by litigation and delayed implementation, confidence in the ability of CALFED or any agency to provide assurances that environmental recovery will be achieved is diminishing.

We recommend that the draft EIS/R be revised to establish a clear regulatory baseline from which the CALFED program will move forward.

We recommend that all species which are now eligible for listing be listed under applicable federal and state endangered species laws as part of the CALFED assurances package. At the very least, the EIS/R should be revised to take this action into account.

7. Physical Limits on New Water Developments

The draft EIS/R fails to examine the relationship between assurances and physical limitations. Nor does it explore how to assure that operational criteria for reservoirs and conveyance facilities will survive as intended, and we are skeptical that such criteria can be fully "assured" over the long term. For example, storage constructed for the limited purpose of capturing "surplus water" could be employed to divert more water out of rivers and streams necessary for envi-

8. Controls on Water Project Operations

While it is widely acknowledged that operational controls will be a key assurance issue, the draft fails to identify any such controls or evaluate their reliability. Operational controls are key to a successful ERPP and conservation strategy and can take several forms. For example, CALFED could craft an "ecosystem-friendly"operations plan establishing protection of natural processes, functions, habitats and species as a key factor in project operations. In addition, the current "Ops Group" could be replaced by a new committee to oversee operations and address conflicts between the ERPP/conservation strategy implementation and project operations as they occur. Moreover, to the extent that a new environmental authority is to be governed in part by water user interests, the governance structure for the federal and state water projects should be revamped to include substantial control by environmental interests. It is essential that the assurance package provide a basic level of parity in the governance of the water management and ecosystem restoration authorities.

We recommend that the EIS/R be revised to explore these proposals.

9. Staging/Phasing/Linkages of Program Elements

Staging is the one assurance mechanism that the EIS/R addresses but in very limited detail. Phasing can be a key assurance element by keeping all parties invested in the success of all program elements. However, the draft EIS/R is very incomplete in its discussion of this issue. First, the draft does not clarify how the adaptive management of the ecosystem restoration plan fits into the staging scheme. Nor does it discuss how the staging schedule would address adaptive management for the water supply reliability program.

Second, the stages as configured in the EIS/R appears to be out of balance. CALFED is proposing that agreements providing (apparently) for some level of No Surprises assurances – or at least for the issuance of incidental take permits – as soon as the draft EIS/R is complete, well

in advance of the establishment of an ecosystem restoration entity or other implementing authority. Indeed, this entity is not scheduled to come on line until many years later. As discussed in greater detail below, the question of what type of assurances are provided to federal, state and other water development interests with regard to future limits on ESA or other environmental regulation is a key issue. In our view, any promises that would suspend the limited safety net of the Endangered Species Act would be inappropriate at the programmatic review stage, particularly in light of the limited information and analysis regarding species impacts – and endangered species impacts in particular – in the draft EIS/R.

Finally, the draft does little more than establish a schedule for implementation. It does not function as an assurance mechanism weaving together the various commitments of the CALFED program in a mutually dependent manner.

We recommend that the EIS/R be revised to include a phasing plan in accordance with the following principles:

* Irreversible commitments benefitting one group should be linked to irreversible commitments that benefit others. For example, funding and permitting for a storage facility should be linked to deed restrictions protecting a certain amount of previously unprotected habitat from alternative uses. To explore appropriate linkages and craft a phasing plan that is more than a schedule, it would be useful to lay out each piece of the performance package (including performance standards for each of the common programs) and determine at least the following:

(1) What is the time frame for completion of this implementation task?
(2) Are there any interim milestones that will be completed in less time?
(3) How reversible is this piece of the solution?

* The phasing program should tie implementation of components that can be disrupted to the benefits of all parties. For example, if the ecosystem restoration program depends upon a functioning water market and the ability to transport purchased water, then some significant component of water user supply also should be dependant upon the a functioning water market and the ability to transport purchased water. In this way the temptations of parties to undermine the advances of different program elements may be lessened.

* Ensure that blocking implementation of any portion of the CALFED package is not in the interest of any party. A system of "mutually assured defaults" should be built into the implementation strategy so that failure to achieve the results specified in the performance package would have known consequences that are less desirable to all parties than achieving such results. As currently proposed, there appears to be no barrier to one part of the program proceeding even if others are stymied. For example, what would occur if federal and state governments refuse to implement or fund portions of the ERPP? The draft does not appear to limit the water mange program from moving forward nevertheless. Mechanisms must be put into place that make all program elements interdependent, particularly with regard to program funding.

* Provide "certainty" to parties in a manner inversely proportional to the elapsed time. For example, a "no surprises" policy that is limited in scope and application might be appropriate during a five year period for certain actions, but the commitments included would become less certain at the ten, fifteen and twenty year points.

* To the extent that the ecosystem restoration program in particular depends upon institutional fixes, these should be put into place before other program commitments are initiated.

10. Remedies

Remedies must be available to the public in the event that program commitments are not fulfilled as intended

This is particularly true for the ecosystem program which is inherently dependent upon thousands of discretionary actions, and contains a high degree of uncertainty. Remedies can include existing tools such as citizen enforcement under the ESA if the plans fail to protect listed species (this is why it is key that all eligible species are listed). However, new remedies should be made available as well and the EIS/R should consider a range of options for enforcing CALFED commitments. For example, the EIS/R should examine the merits of enabling legal action in the event that the ERPP/Conservation Strategy performance standards are not met or if projects violate the terms of the operating rules intended to benefit the environment. We realize that such proposals are likely to be controversial. Nevertheless, the system must contain backstops to discourage defaults in program expectations as well as to provide relief. Such measures can be crafted in a limited way that makes them available only when the circumstances warrant.

CALFED seems to be addressing the issue of remedies only through its proposal to develop a "contingency plan" for dealing with a breakdown in the implementation schedule. This should be part and parcel of the assurances package, not another separate planning exercise. As we have indicated previously, the assurances package should be tiered with a series of default mechanisms available all the way down to legal remedies.

We recommend that the EIS/R be revised in accordance with the proposal above.

B. ESA Compliance Technical Appendix

In sharp contrast to the very limited approach to environmental assurances contained in the EIS/R, CALFED has provided a detailed "ESA and CESA Compliance" paper intended to guide the process for incidental take permits. This paper outlines a future Conservation Strategy geared primarily toward ensuring that human actions that affect listed species are able to be permitted under the applicable statutes.

Importantly, CALFED did not make the draft Conservation Strategy available for public review with the draft EIS/R. The paper provided – in the Errata to the EIS/R – states that such a document will be forthcoming. Thus, the pubic and decision makers are given virtually no information about the direction and substance of the proposal for ESA compliance.

In essence, CALFED is proposing to use the Conservation Strategy in conjunction with the EIS/R as the Section 7 consultation required by the federal ESA. These two documents are intended to serve together as a kind of programmatic biological opinion for the entire CALFED program. In addition, they will be used as the site-specific biological opinions for specific Federal actions proposed. They are also intended to serve as the basis for "HCPs that might be necessary." Save The Bay has several responses to this proposal.

1. When Take Permits Would Be Required, and for Which CALFED Actions, Unclear.

There is an internal tension in the draft between the fact that the CALFED program is now limited to a programmatic level of review, with site specific analyses a long way off in many cases, and the press for issuance of incidental take permits following the Record of Decision on the EIS/R. As discussed above, the programmatic alternatives and their impacts are only very superficially described and there is virtually no information on site specific projects (other than those listed in the ERPP). The CALFED Program has been explicit that further environmental review – including ESA and Section 404 permitting – will be required prior to any site specific project permitting.

Nevertheless, the compliance paper states that in fact the programmatic EIS/R will serve as the site specific NEPA/CEQA documentation for at least some projects from the common programs and some conveyance actions within the Delta and "interim changes to operating procedures for water storage and conveyance." It is impossible to assess the sufficiency of the Conservation Strategy as a mechanism for authorizing incidental take without clear and specific information about the actions under review.

> *We recommend that the EIS/R be revised to (1) identify the specific actions that CALFED intends to implement in Stage 1 (0-7 years from the Record of Decision on the programmatic EIS/R); and (2) provide a schedule for implementation indicating when incidental take permits would be required for such projects.*

2. "Programmatic" Incidental Take Permit Improper

We concur that the EIS/R and the conservation strategy should serve together as the assessment of impacts to listed species for the CALFED program. As discussed above, these planning approaches should be merged or at least fully coordinated. We agree with the approach outlined in the compliance paper indicating that the agencies will examine the entire program from the perspective of each covered species and habitat and determine which specific program actions are likely to (or could) affect such covered species and habitats. This assessment should be conducted with an eye toward identifying potential harm to such species and habitats and identifying appropriate mechanisms to avoid entirely harm to, or take of., such species and habitats. Similarly, it would be useful for the agencies to identify the types of restrictions on harm to identified species, mitigation measures or research gaps that will be needed in the implementation phase.

However, the draft proposes that the Conservation Strategy will go beyond this assessment stage and will serve as a "programmatic" biological opinion, presumably including a "programmatic" incidental take statement. This is unacceptable to Save The Bay. In light of the massive scope and breadth of the CALFED program it is neither practicable or appropriate to permit take of listed or other covered species based solely on a programmatic level environmental review. An incidental take statement relies on the ability of the agency to assure that species or designated habitat will not be jeopardized. Such assurances are not feasible on the massive scale of the CALFED programmatic EIS/R. (Save The Bay does support near-term implementation of those actions that are the subject of a complete site-specific EIS/R and a biological assessment).

Moreover, the draft EIS/R and Conservation Strategy do not provide a high degree of confidence that the level of analysis and information disclosure in the programmatic document will be in any way sufficient to support the issuance of a biological opinion, much less some type of programmatic incidental take permit. (See comments above.) For the same reason we are very troubled by the suggestion in the draft that the agencies are considering a "programmatic take permit."

We recommend that the EIS/R be revised to eliminate the suggestion that the agencies will issue a programmatic biological opinion or incidental take statement, or to limit this proposal to actions that will have a net environmental benefit.

3. Clarification of Intent Regarding No Surprises Policy Required

The draft suggests that the agencies have abandoned the notion of a programmatic HCP covering the entire CALFED program. It further suggests that the agencies anticipate that individual HCPs will be required for CALFED actions that would be implemented by non-federal parties. This continues some of the difficulties discussed in the conservation community letter to CALFED of October 20, 1997 incorporated herein by reference in its entirety.

'he draft fails to discuss the ıature of the No Surprises .ssurances that would be ırovided to the state or ıther non-federal parties mplementing portions of he CALFED program pur- uant to the federal HCP ırogram

First, assuming that the State will have a significant implementing role certain to involve take of covered species, what is the agencies' intent with regard to an HCP? For example, is it expected that the State will prepare a habitat conservation plan to mitigate the environmental impacts associated with a new surface water reservoir? If so, how would such a plan relate to the CALFED ERPP? The draft provides no insight into how these apparently distinct planning efforts would interrelate or whether adherence to this model works to the benefit of ecosystem restoration and endangered species recovery.

Second, of greater significance, the draft fails to discuss the nature of the No Surprises assurances that would be provided to the state or other non-federal parties implementing portions of the CALFED program pursuant to the federal HCP program. Our concerns in this regard are set forth in more detail in the EWC letter to the CALFED Bay-Delta Program referenced above.

We recommend that the EIS/R be revised to disclose the agencies' intentions for incorporating the federal HCP process into the CALFED Program and the relationship of this process to (1) the larger assurances package and (2) ERPP implementation.

4. Unified Set of Restoration and Recovery Goals Required.

The draft suggests that the Conservation Strategy will contain its own recovery goals. We strongly agree that endangered species concerns should inform recovery goals for specific species or habitats. However, these recovery goals should be the driving force in the ERPP – they should serve as part of the performance objectives for the ecosystem restoration program. As discussed above, the ERPP should serve as the action plan for the species recovery aspect of the Conservation Strategy. CALFED should not prepare separate ecosystem recovery plans with distinct recovery objectives.

In other words, to the extent that the Conservation Strategy would posit a higher standard for environmental recovery than the ERPP, the ERPP should embrace and incorporate the goals established by the ESA compliance analysis. Conversely, if the recovery objectives in the ERPP are more ambitious than the ESA recovery goals, than the Conservation Strategy should incorporate those higher standards.

We recommend that the EIS/R be revised to compare the restoration and recovery objectives of the Conservation Strategy and the ERPP and to adopt as performance measures for both the most ecologically protective standards.

5. Assurances Proposal Impermissibly Vague

The draft lists various 'assurances" that the Section 7 process would allow for in the CALFED process and states that a variety of these will be used without further elaboration. The draft goes on to state that ESA consultation would "only occur after all adaptive management measures have been exhausted or a significant change is made to the project description."

If the door on ESA consultation is to be shut this firmly, it is essential that the EIS/R shed some daylight on what the agencies are proposing in the way of "assurances" for the federal agencies subject to the consultation requirements – primarily the massive federal water development projects. Moreover, as discussed above, we cannot concur that any firm assurances should be provided given the substantial uncertainty surrounding how to achieve the species and ecosystem recovery at issue in the CALFED program.

We recommend that the EIS/R be revised to contain a complete discussion of (1) the "assurances" that are being contemplated in connection with the Section 7 consultations and (2) how such assurances would be limited to account for the current lack of certainty regarding species and habitat recovery.

6. Unified Adaptive Management Program Required

The EIS/R states that the Conservation Strategy will contain an adaptive management and monitoring program and that this effort will supplement the adaptive management and monitoring programs being developed as part of the ERPP. We strongly concur that Endangered Species Act compliance requires monitoring and an adaptive management program. However, the ecosystem restoration program should function as a comprehensive recovery plan for covered species and the monitoring program and adaptive management approach should be sufficiently broad to address endangered species recovery requirements.

We recommend that the draft EIS/R be revised to provide the pubic and decision makers with an integrated monitoring program and adaptive management program that addresses endangered species concerns together with the additional objectives of the ERPP.

7. Conservative Approach to Contingencies Required

The agencies intend to devise a process for dealing with "unforeseen circumstances" surrounding endangered species recovery issues. However, given the scope and breadth of the program, the reality is that many if not most of the "circumstances" regarding species recovery will be unforeseeable. While much is known today, there is considerable uncertainty (and at least as much dispute) about how to restore, rehabilitate and recovery the vast number of depleted species and particularly how to do so while simultaneously meeting the water supply reliability and other program goals. Restoration plans developed today may be right on target, or may be largely irrelevant in ten years.

We recommend that the EIS/R be revised to adopt as a base assumption that the ecosystem and endangered species recovery plans being developed in the CALFED program contain substantial amounts of uncertainty as to their ability to actually achieve recovery of jeopardized species and habitats. Therefore, it should be assumed that many actions will be required to be taken that are unforeseeable today.

Given uncertainty as a base assumption, and CALFED's commitment to an adaptive management approach, the EIS/R should clarify what is meant by a "contingency" and the need for a contingency plan.

Any contingency plan developed with regard to endangered species recovery should be merged with the contingency plan for assurance issues generally and should not be a separate effort.

8. Single Funding Approach for Endangered Sp[ecies and Ecosystem Restoration

We recommend that the funding strategy for implementing the Conservation Strategy be fully merged and integrated with funding for the broader ecosystem restoration program.

COMMENTS ON CALFED'S DRAFT EIS OF MARCH 1998

for
Save San Francisco Bay Association

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June 30, 1998

Consulting Economists

I. INTRODUCTION AND SUMMARY

At the request of Save San Francisco Bay Association, National Economic Research Associates (NERA) has reviewed the CALFED's Draft Programmatic Environmental Impact Statement (EIS) of March 1998, especially the Water Use Efficiency Component Technical Appendix, and the California State Department of Water Resources (DWR)'s Bulletin 160-98 public review draft (the Bulletin).

The EIS relies heavily on the work of the DWR's Bulletin. As a result, we have addressed some of the methodological problems presented by this document in commenting on the EIS. The DWR produces the Bulletin every five years as required by the California Water Code to provide guidance for state water policy and planning. Our review of the Bulletin raises serious concerns regarding the DWR's forecasts of water supply and demand and the methodology for evaluating supply and conservation options. These flaws undermine the DWR's conclusions regarding the need for new water supplies and the most attractive options for meeting demand increases. The CALFED EIS suffers accordingly.

We have also critiqued CALFED's Water Use Efficiency Component Technical Appendix. The reasoning in this document also suffers from many of the same flaws as those found in the Bulletin. Moreover, the Technical Appendix also fails to consider economic efficiency in addition to physical efficiency, and thus is not a reliable guide for policy analysis.

II. THE DEPARTMENT OF WATER RESOURCE'S BULLETIN 160-98

The Bulletin, as it stands, is inadequate for the purposes to which CALFED has applied it. Not only does it fail to adequately account for supply and demand, it unnecessarily focuses on supply/demand equilibrium within hydrologic regions as its primary objective. This focus reflects the traditional central planning approach to water resource management, which fails to fully recognize the importance of market forces in achieving the most efficient allocation of water resources.

The Bulletin also fails to adequately account for the fact that different water-related projects have different objectives—not all projects are primarily intended to increase supply or reduce demand. Some projects are principally designed to protect or enhance the environment

while others are intended to provide flood control. This distinction is not adequately captured in the evaluation framework employed by DWR to recommend the most attractive water supply and management options.

A. Overview Of Bulletin 160-98

The Bulletin presents the Department of Water Resources' (DWR) most recent supply and demand water forecasts indicating that without further government action, California will face a water shortfall of 2.9 million acre-ft by 2020 in an average year. The projected shortfall is greater in a drought year, 7.0 million acre-ft by 2020. Three regions—South Coast, San Joaquin River and Tulare Lake—account for over 75 percent of the shortfall in an average year and 66 percent of the shortfall in a drought year. For most regions, the shortfall is a small fraction of that region's total demand, not accounting for any new facilities or program implementation. In fact, 7 out of the 10 hydrologic regions have shortfalls measuring less than 10 percent of each region's respective demand for water in any average year. Even in drought years, 4 out of 10 regions are predicted to experience shortfalls less than 10 percent of each region's total demand.

The DWR recommends a series of regional and statewide options to meet the forecasted deficits, but comes up 1.38 million acre-ft short in an average year and 3.94 million acre-ft in a drought year. Eighty-five percent of the average year shortage is projected to occur in two regions—San Joaquin and Tulare Lake. Approximately 56 percent of the average year shortage is expected to occur in the San Joaquin River Region and another 30 percent in the Tulare Lake Region. These regions jointly account for 69 percent of the projected drought year deficit, with San Joaquin River contributing 39 percent of the total drought year shortage and Tulare Lake contributing 30 percent to the total.

The DWR recommended supply options would add 1.04 million acre-ft in an average year by 2020. Recommended demand management options (conservation, recycling, and some transfers) constitute less than one percent of total projected demand, a reduction of 0.5 million acre-ft. In a drought year, recommended supply options amount to 2.54 million acre-ft with demand management efforts measuring roughly the same as in an average year, again, 0.5 million acre-ft.

B. Issues Relating To DWR's Determination Of Water Supply And Demand

Below we present our concerns regarding the DWR's water supply and demand forecasts and the methodology used for recommending options to meet projected deficits. Overall, we have concluded that the uncertainties and omissions in DWR's forecasts are sufficiently large that the projected deficits are highly speculative. In addition, the DWR's recommended water supply and demand management options are questionable because the Department's methodology fails to adequately account for the benefits and costs of the various options and fails to adequately account for potential tranfers between regions.

1. Water Supply

The DWR's projection of water supply to the year 2020 is inadequate for two principle reasons, both linked to a basic failure to adequately account for supply responses to changes in demand. First, it ignores interregional transfers and restricts out-of-state transfers to those already identified. Second, it fails to account for within-region supply responses to price increases.

a. Treatment of Water Transfers

Although the DWR allocates state-controlled water supply sources to the various hydrologic planning regions, it does not provide for trading between the regions beyond existing agreements. This ignores what appear to be substantial opportunities for trade even using DWR's questionable option-ranking system. For example, DWR projects a water deficit in the Tulare Lake Region in 2020 of 408 taf after accounting for statewide options at costs of up to $175 per acre-ft and local options at costs of up to $500 per acre-ft. At the same time, DWR does not recommend several recycling options available in the South Coast that it determined are unneeded to meet South Coast demand, which could provide over 200 thousand acre-ft at a cost of $500/acre ft or less. These projects could, for example, reduce South Coast demand for state water, allowing for more water to flow to Tulare Lake. Such a transfer would be attractive if South Coast recyclers could sell to Tulare Lake users.

b. Supply Responses to Price Increases

The DWR does not address the issue of water price in Bulletin 160. No price forecasts are presented. If prices rise, however, supplies in the form of greater recycling,

efficiency improvements, and new technologies will be created. Although the DWR recognizes these possible responses, it only includes already-committed responses for the most part. Additional responses resulting from higher prices are not incorporated into the supply estimate. Advanced technologies are identified but not recommended because of high capital and operating cost projections. These options may become economic with water price increases.

2. Water Demand

The DWR's water demand forecast is extremely simplistic and apparently not influenced by possible water price changes. Although the DWR devotes a section of the Bulletin to urban and agricultural water price elasticities, these values are not clearly employed in the demand forecasts. Moreover, there is no discussion of water price in the Bulletin. Clearly, increases in water prices should be expected and may be necessary for the successful implementation of many of the identified projects in the Bulletin. Price increases are also critical to the case in which, as projected by the Bulletin, demand outstrips supply. Pricing alone could result in more conservation, more crop substitution, more land retirement and more transfers than are currently incorporated in the DWR forecasts.

Nowhere is this deficiency more apparent than in the urban demand forecasts for the Tulare Lake and San Joaquin River regions. In these regions, which are expected to face the most substantial deficits, urban water use per capita is assumed to fall modestly. Per capita consumption in Tulare Lake is forecasted to fall from 311 gallons per capita per day (GPCD) in 1995 to 274 GPCD in 2020, assuming the existence of some baseline conservation measures. Similarly, San Joaquin River per capita urban consumption is projected to fall from 301 GPCD to 269 GPCD by 2020. Comparing these consumption levels to those of San Francisco or Los Angeles suggests that much lower consumption is possible. In view of the forecasted shortages, higher prices could go a long way toward reducing the forecasted deficit. If, for example, Tulare Lake urban consumption were to fall to the state average (a reduction of almost 26 percent), the deficit for that region, assuming a budget with existing facilities and programs only, might fall as much as 19 percent in a drought year and 47 percent in an average year. Substituting the statewide urban consumption rate into Tulare Lake's budget that includes the Plan's recommended options, the region's shortage might decrease by 34 percent in a drought year and by as much as 86 percent in an average year by 2020.

C. Integration of Supply and Demand

Integrating supply and demand is essential for establishing the value of water and for determining the most efficient allocation of water resources. The efficient allocation is defined where the marginal benefit of water supplied equals the marginal cost of supply. The DWR, however, does not attempt such an integration. Instead the DWR recommendations are based on an option scoring method, which inadequately accounts for the costs and benefits of the options considered. As a result, the DWR cannot demonstrate that its recommendations would result in an efficient allocation of water resources.

1. Matching Supply and Demand

The DWR presents very little on the integration of supply and demand in the Bulletin. Each region is treated independently with respect to supply and demand with the exception of the allocation of state water supplies and a few previously arranged transfers. No attempt is made to optimize available and potential supply with projected demand. This ignores what appear to be substantial opportunities for trade across regions. According to the DWR's numbers, several regions could, for example, provide water to Tulare Lake and San Joaquin at costs lower than those available within those regions.

2. Valuing Water

Perhaps most importantly, the DWR approach fails to recognize that different users place different values on water, water quality and water reliability. For example, the DWR does recognize that there is a tradeoff between the costs of programs to create supply during a drought, noting:

> Agencies may evaluate the marginal costs of developing new supplies and may conclude that the costs of their development exceeds the cost of shortages to their service areas, or exceeds the costs of implementing measures such as transfers or rationing (p.10-10 to 10-11).

Unfortunately, the DWR does not explicitly make such tradeoffs in its own review of water management options. In fact, the DWR approach results in a set of recommended options designed to alleviate drought conditions without clearly identifying the costs of these options or the consequences of not implementing them. Consequently, agencies are not given any guidance by the Bulletin to make the necessary tradeoffs. Moreover, to the extent that the DWR has applied this approach in deciding to leave the Tulare Lake and San Joaquin Regions in deficit, this rationale has not been clearly stated within the report.

3. Option Ranking

The DWR employed a simple and highly arbitrary ranking method to determine which supply and demand options to recommend in each hydrological region. Each project was ranked on a 0 to 4 scale (4 being the most favorable) in six categories: Engineering, Economics, Environmental, Institutional/Legal, Social/Third Party, and Other Benefits.

Thus, the maximum possible score for an option is 24 points (6x4). This approach does not allow for a rational comparison of options within regions or between regions. All categories are given the same weight or importance. Following this method allows for unlikely outcomes. For example, a project with a cost of $150 per acre-ft and scores of four in the engineering, economics, environmental, but scores of 1 in the remaining categories (therefore, a total score of 15) would be ranked lower than a project with a cost of $500 per acre ft and scores of 2 in the engineering, economics and environmental categories, but scores of 4 in the remaining attributes (therefore, a score of 18). This suggests that the other categories impose costs on society in excess of $350 per acre-ft (the difference between 500 and 150). Is society really willing to pay such a premium? Although DWR analysts may consider institutional or other benefits low, without clearly identifying the tradeoff between options there is no way for the public to choose between options.

One important tradeoff hidden by the Bulletin's current evaluation approach is the ability to value more flexible, short-term options for meeting demand against more capital intensive long-term options. None of the Bulletin's option categories account for this tradeoff. Ironically, it may be one of the most valued characteristics to evaluate considering the economic, engineering and environmental impact of choosing a lower-risk, less vested option that will avoid amassing potentially gross capital expenditures in the future especially if the

demand shortage is temporary or short-lived. This issue is better known as the "stranded cost" issue and has been at the center of several heated public debates over who should bear the cost of sunk investments that cannot be recovered.

The potential stranded cost problem can be seen in the DWR final recommendations at the state-level. The distribution of supply-side and demand-side options looks very different when comparing the average year to the drought year. As illustrated in Figure 1, local demand options in an average year constitute approximately 28 percent of total water supplied by the Bulletin's recommended options with local supply options providing 35 percent of the total and statewide options filling in the remainder. Under drought conditions, the role of local supply options jumps from 35 to 56 percent. Thus, the DWR is recommending substantial investment in supply to meet drought conditions. Local agencies are being encouraged to build capacity they may rarely, if ever, need. This contradicts the DWR's own observation that drought-related investments must be compared to the cost of enduring the drought and leaves local agencies at risk of incurring stranded costs.

The DWR approach fails to adequately define how much benefit or value each option provides and to whom. For example, an option may provide 100 acre-ft at a cost of $500 an acre-ft, but urban water users are only willing to pay $300 because it is cheaper to conserve or use another source. At the same time, society may be willing to pay $600 for the 100 acre-ft to protect an endangered species. The best the DWR framework can do is score this project high on the environmental category. There is no way to assign the option a specific value to compare against the options cost and against other projects.

This problem can be avoided by employing a benefit-cost approach to valuing alternatives. The benefits of each option would include the amount of water provided or saved and other characteristics such as flood control and environmental protection. These characteristics can be quantified in dollar terms. Benefits of flood control can be determined by the value of flood damage avoided. Environmental protection benefits can often be estimated as well. Economists have several tools designed to estimate wildlife and recreational water uses. Even if dollar values cannot readily be assigned for these uses, a more explicit accounting of the environmental gains or issues are necessary to make informed decisions regarding water supply and management options. For example, one option may protect a large

fraction of an endangered fish species while another may protect an endangered plant. A direct comparison of this sort rather than a rank of 0 to 4 enables policy makers to make clearer tradeoffs.

Option costs would include the capital and operating costs. These costs could incorporate the cost of uncertainty regarding performance not to mention demand. Note that this would avoid the need for an engineering score. Costs would also include any potential environmental damage.

Projects would then be ranked on a net benefits (benefits-costs) basis. These rankings would account for the characteristics identified by the DWR and explicitly account for the value of each option. Options would be recommended in order from highest to lowest net benefits sufficient to meet projected demand and allow for all economic trades between regions Note that this method can accommodate options with benefits and costs not readily quantifiable because it provides the means to explicitly identify the tradeoffs between options.

III. CALFED'S DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Beyond the methodological problems that pervade the DWR Bulletin and, as a result, the CALFED EIS, we focus here on the CALFED EIS' technical appendix's failure to consider economic efficiency.

A. Defining Efficiency

CALFED adopts a conventional physical definition of efficiency: minimize the ratio of water applied to water consumed. From a planning perspective, a more appropriate objective is economic efficiency: maximize economic value produced with a given amount of water. This definition applies at the farm-level, as well as the regional or state level. At higher levels of aggregation, however, maximizing economic value may well require reallocating water supplies, by regulation or by markets, among sectors of the economy and geographic areas.

There is an important distinction between farm-level and regional water use efficiency. Farm-level efficiency is most commonly expressed as the ratio of crop evapotranspiration (ET) to applied water for a specific farm. Regional efficiency considers

more than just one farm. The CALFED analysis implicitly assumes that conservation only produces "real" savings in areas where return flows are lost to the system (e.g., near the coast or in areas with saline groundwater). This assumption is quite strong, and biases the analysis against conservation. For example, there is considerable evidence that adoption of low-volume irrigation systems in agriculture can reduce evaporation, particularly on immature vineyards and orchards. This is a physical issue that deserves greater attention in the document.

There is an even more serious problem with CALFED's basic conceptual framework. The analysis fails to consider economic values and tradeoffs between various uses of water. For example, the analysis assumes that agricultural conservation provides no benefit to the state's water system unless the farms in question overlie saline groundwater, in which case the return flows would be lost in any case. However, even if regional physical efficiency is high, diversion harms instream habitat (which has an economic cost) and the economic value produced with diverted water may not justify this degradation from a societal point of view. To take another example, water used in the urban sector frequently has a higher marginal productivity than water used in agriculture. From an economic perspective, efficiency and social welfare may be increased if water is reallocated from agriculture to urban areas, with no increases in diversions.

The failure of the efficiency analysis to consider economic values is even more distressing when considered in light of a potential outcome of the CALFED process: construction of expensive new storage facilities to stabilize and increase diversions. It is probable that some current uses of water already diverted generate less economic value per acre-foot than the marginal cost of providing new supply. CALFED should make this comparison, and if the results are as hypothesized this is a strong argument against new construction. Simply put, CALFED should investigate how well we are using current supplies before recommending construction of new facilities. A more appropriate efficiency analysis would measure the economic value (i.e., revenue, profit, consumer surplus) produced in various regions by urban and agricultural water consumption.

Measuring willingness to pay for existing supplies would also give CALFED a way to judge the desirability of proposed conveyance facilities. Current limitations on transfers are due in part to conveyance constraints and environmental regulations governing the Delta.

Once economic values of water were computed along the lines suggested above, the CALFED staff would be able to measure the gains from additional trades resulting from construction of various conveyance facilities. These social gains could then be compared to construction and operating costs.

B. Financial Incentives

Even if one adopts the strict physical definition of efficiency, economic factors enter the picture in another way: farmers will use water as efficiently as financial incentives dictate. Numerous economic studies have demonstrated that water use changes as farmers receive different price signals about the value of water. Recent research conducted at UC Berkeley under a Challenge Grant from the Bureau of Reclamation has painted a more complex picture of on-farm water use than existed previously. As detailed in annual reports to the Bureau, this research has shown how environmental and economic factors interact to influence water management at the micro level.

Farmers have several potential responses to changes in water price: fallowing, technology adoption, crop shifting and more intensive management. Generally, decisions such as fallowing and management that do not require significant up-front outlays are adopted in the short-run. Crop shifting and irrigation technology investment are longer-term responses. One important conclusion of the UC Berkeley research is that soil quality and weather conditions play a large role in determining land allocation and technology choice. Thus, the response to water price is optimized to local growing conditions.

Due to the importance of local factors, financial incentives are likely to outperform best management practice regulations that dictate on-farm water use. It is reassuring that the document recognizes this explicitly and emphasizes incentives over regulatory actions. Regulatory actions such as BMPs may actually reduce efficiency as a result of their one-size-fits-all nature.

Given the importance of financial incentives, it is worth reviewing some evidence on how farmers respond to various types of price reforms. This data was generated by the UC Berkeley team of economists working under the Challenge Grant described earlier.

C. Volumetric Water Pricing

In the spring of 1995, Arvin-Edison Water Storage District (AEWSD) altered its rate structure from contracted water allotments to use-based allocation. Historically each grower had been contracted a given allotment of water per acre. If growers desire more, they may either pump ground water or purchase additional water from the AEWSD, if available. With the change in the rate structure growers are no longer limited to a specific quantity of water and the variable portion of the charge has been increased to discourage excessive water use. One of the specific goals of this policy change was to target some water uses that the AEWSD thought were wasteful, especially pre-irrigation and other year end irrigation activities.

Prior to the rate reform, when growers had water left over at the end of the year they would typically use it on low value cover crops, such as hay, or use it for pre-irrigation. This use of water did not produce much value added, but growers perceived the water was already paid for since it was specified in the contract.

To date, there appears to be a measurable response to the change in the rate structure. For example, there was a 1,200-acre reduction in hay and a 900-acre reduction in small grains, both of which tend to be low-value cover crops. There was also an 800-acre increase in potatoes, a 400-acre increase in onions and a 500-acre increase in miscellaneous truck crops, all of which are considered medium- to high-value crops. The end result of the change in the rate structure appears to be a small increase in water use per acre (which is achieved with a reduction in the total number of acres farmed and a reduction in potentially uneconomic practices such as pre-irrigation and double-cropping), and an increase in the economic value produced per acre-foot of water applied.

D. Water Trading

Water trading among growers serves many of the same functions as increasing the price paid to the district. Water trading can increase the marginal price of water; significantly, it also avoids the revenue neutrality requirements that hamstring most district-implemented conservation measures such as tiered pricing and buybacks. There are three basic conclusions of the Challenge Grant work on trading within Westlands Water District: 1) there

is extensive participation in the internal market, 2) the water market helps growers cope with surface supply fluctuations and 3) water trading has especially important benefits to small landowners.

1. Level of Market Activity

The volume of water traded within Westlands ranged from a high of 410,493 AF in 1995 to a low of 284,540 AF in 1994. When measured in terms of the share of the CVP water supply, the market was actually more active in 1994 than in 1995. The volume traded in 1995 was only 27 percent of the district's CVP allocation for that year, while the volume traded in 1994 was 45 percent of the allocation for that year. In 1993, the volume traded was 51 percent of the CVP allocation, and in 1996 the volume traded was 28 percent of the allocation. Even though the volume of water traded was greater in 1995 and 1996, farms made fewer trades in those years than in the water-short years of 1993 and 1994. Farms made 2,580 trades in 1994, the year with the most trades and the smallest water allocation. Farms made the fewest trades in 1996 (1,673 trades). The average size of a trade varies significantly from year to year. It was smallest in 1994 (110 AF per trade) and largest in 1996 (236 AF per trade). When measured according to farm participation rates, the market was most active in 1993. A total of 226 farms sold water at least once during the year and 186 farms bought water at least once during the year. 153 farms both bought and sold water. As a share of the total number of farms in Westlands, 64 percent sold at least once, 53 percent bought at least once and 43 percent both bought and sold.

It is well known that Westlands growers operate under nearly continuous conditions of water scarcity. The Westlands water market is an adaptation to this scarcity, and the innovative behavior of these growers is a model for how other California farmers can respond to future changes in water supplies. Many Westlands growers obviously find merit in water marketing, and there is good reason to believe that landowners in other parts of the Valley can learn to operate in this way as well.

2. Trading Patterns by Priority Area

Westlands is divided into three priority areas (1, 2 and 3). When Westlands receives its full allocation, land in priority area 1 receives 2.2 acre-feet per acre and land in

priority areas 2 and 3 receive 1.5 acre-feet per acre. During dry years, supplies are first reduced from area 3, then area 2 and finally area 1. Thus, during some years, priority area 1 may receive its full 2.2 acre-feet per acre while the other two areas receive nothing. Priority area 1 has the most senior rights, followed by area 2 and then 3.[1]

In each of the four years considered, net transfers in area 1 were negative, and net transfers in areas 2 and 3 were positive. The movement of water from area 1 to areas 2 and 3 was greatest in 1996 and least in 1994. In 1996, the net loss to area 1 was 114,241 AF, the net gain to area 2 was 101,272 AF and the net gain to area 3 was 12,969 AF. In 1994, the net loss to area 1 was 44,532 AF, the net gain to area 2 was 36,018 AF and the net gain to area 3 was 8,514 AF. While the net transfers in each area varied significantly from year to year, the net transfers in terms of the share of the total annual CVP allocation were fairly constant. The loss to area 1 in 1996 represented eight percent of the total CVP allocation of 1,425,000 AF. The loss to area 1 in 1994 represented in seven percent of the total CVP allocation of 637,000 AF. In 1993 and 1995, the loss to area 1 represented six percent of the total allocation for the given year.

Significantly, priority area 2 is where most of the perennial crops are grown in the District. This allocation occurs despite the fact that this area has a less stable water supply than area 1. Without an active internal market, it is highly doubtful that growers would be able to produce tree and vineyard crops on area 2's high-quality soil. This is one sense in which water trading can help growers cope with supply fluctuations, as it provides a way to reallocate water supplies to those crops with the greatest level of capital investment in water-short years.

E. Market Trading Patterns by Farm Size

For purposes of this discussion, define a farm to be small, medium or large depending on its total acreage. Small farms are 960 acres of less, medium farms are 960 – 5,760 acres and large farms are greater than 5,760 acres. Depending on the year, 60 to 64 percent of the farms in the district were small farms, 27 to 30 percent were medium farms and 9 to 11 percent were large farm.

[1] Priority area 3 encompasses a relatively small area of the district, and thus does not account for a large share of the trading activity.

In each year considered, market participation rates were greatest among large farms and lowest among small farms. Among small farms, 21 to 32 percent bought in a given year and 30 to 47 percent sold on the market. Among medium sized farms, 43 to 66 percent bought water and 46 to 63 sold water. Finally, 75 to 85 percent of large farms bought water and 59 to 76 percent of large farms sold water.

Due to their smaller size, small farms traded less water in total than medium-sized farms; medium farms also traded less water than large farms. The average number of acre-feet traded was lower in 1994 than in the other years for each size group. The average number of acre feet traded was greatest for medium and large farms in 1995 and greatest for small farms in 1996.

While small farms bought and sold less in total than other types of farms, small farms actually traded more in terms of acre-feet per acre than medium and large farms in each year. Further, whether small farms buy or sell on the market is related to the type of water year. In the water-short year of 1994, small farms bought 0.40 acre-feet per acre on average, and sold only 0.22 acre feet. In 1996, by contrast, small farms bought 0.48 acre-feet per acre on average and sold 0.90. In 1996, medium farms bought 0.28 acre-feet per acre and sold 0.21 acre feet. Large farms bought 0.29 acre-feet per acre and sold 0.21 acre feet.

It is significant that market trades account for a significant fraction of the total water supplies of small farms. Assuming a farm is located in Priority Area 1, it received a CVP allocation of 2.2 acre feet per acre in 1996. Thus, if a small farm purchased 0.48 acre-feet per acre, it increased its initial allocation by 22 percent. If a small farm sold 0.90 acre-feet per acre, it reduced its initial supply by 41 percent. Of course, many farms both bought and sold water. If a small farm bought 0.48 acre-feet per acre and sold 0.90 acre feet, these trades represent a net reduction in supply of 0.42 acre feet per acre which is a 19 percent decrease from its initial CVP supply.

This research indicates that small farms rely on the water market more than large farms. More important, it shows that the market is an especially important supply source for small farms during water-short years. While these results are preliminary, they are highly suggestive, and indicate that water markets may have important equity consequences in addition to their efficiency benefits.

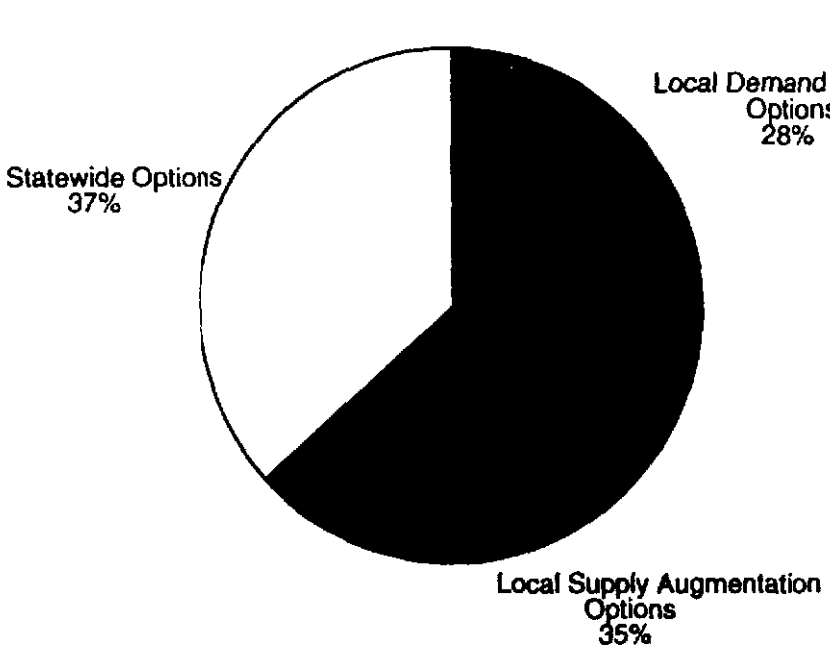
IV. RECOMMENDATIONS AND CONCLUSIONS

The CALFED efficiency analysis and the closely related Bulletin 160 are not useful documents with which to assess the desirability of CALFED alternatives or proposed common elements. A more useful analysis would define water supply and demand with reference to economic values rather than use the simple physical efficiency approach and ad hoc ordinal ranking employed.

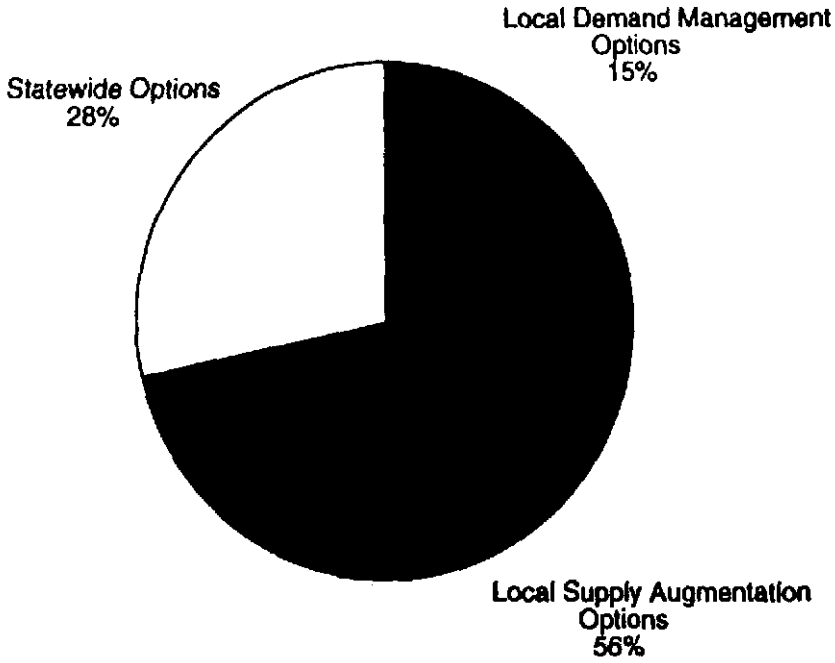
A large body of economic literature demonstrates that farmers and urban water consumers respond in rational and predictable ways to changes in water price and availability. Well-designed financial incentives can lead to improved water allocations and maximize the economic value of existing supplies. No decisions regarding provision of additional supplies should be made until CALFED identifies and evaluates these types of incentives.

Figure 1:
Comparison of Average Year and Drought Year Distribution of Supply- and Demand- Side California Water Plan 2020 Options

(Category as % of Total Plan Options)



Average Year



Drought Year

Source: Based on Table 10-3, Bulletin 160-98 Public Review Draft, p. 10-7.

ATTACHMENT TWO

Environmental Water Caucus

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August 12, 1998

By Hand Delivery

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RE: Draft Preferred Alternative Document

Dear Secretary Wheeler and Mr. Perciasepe:

We write to express our alarm about the "phasing document" under consideration by the CALFED Policy Group. Time has not permitted a thorough review of the newly released version, although it appears similar to the July 8 draft in major respects. The phasing document is fundamentally flawed in its approach and we are concerned that it is being employed to justify public funding for a range of highly controversial water development facilities. It is of the utmost importance that the Policy Group address our concerns at the meeting scheduled for this week.

1. The Assumption That Storage Will Benefit The Environment Is Unfounded. The document rests on the notion that even more water can be extracted from the severely-depleted Bay-Delta system and manipulated to result in net ecosystem benefits. As we have demonstrated, there is little, if any, support for this untested, unproven hypothesis in the EIS/EIR and there is substantial evidence to the contrary -- that decades of freshwater depletions are in large part responsible for the highly degraded state of the Bay-Delta Estuary. Reliance on the "storage is good" theory permeates the phasing document and EIS/EIR and is a fatal weakness in both.

2. Surface Storage Is Already Included In the Preferred Alternative. The phasing document indicates that new surface storage will be in the preferred alternative as long as certain conditions are met. (Page 14.) This is a major programmatic decision coming before the extensive criticisms of the EIS/EIR have even been considered much less addressed.

This decision is particularly untenable in light of findings by the California Research Bureau (a non-partisan division of the State Library) which has concluded that the EIS/EIR overestimated baseline urban demand by more than 1 million acre-feet, made other key

forecasting errors and thus substantially over-stated projected demand. (See Testimony of Dennis O'Connor before the Senate Select Committee on CALFED 8/5/98.) In other words, the EIS/EIR fails entirely to support CALFED's decision to build new surface storage. We object to any CALFED decision to include new surface storage in the preferred alternative prior to a complete revision of the EIS/EIR's demand projections, as well as the highly flawed analysis of environmental impacts related to such facilities. If storage is included without a rigorous willingness-to-pay test on the part of beneficiaries, CALFED will be extending the long list of environmentally destructive and economically unjustified water supply projects which have caused much of the harm to the Bay-Delta ecosystem.

3. Storage And Conveyance Are Elevated To The Status Of CALFED Objectives. It has been an article of faith for some time that the solutions for the four CALFED problem areas (ecosystem restoration, water supply reliability, water quality and levee system vulnerability) would be implemented through linkages to assure fair and equitable progress in all areas. However, the phasing document identifies Storage and Conveyance as equivalent "program elements" and indicates that forward progress in each must be linked to forward process on ecosystem restoration and all of the other common programs. This is a major departure from CALFED's longstanding definition of its objectives -- in this document, "water supply reliability" becomes synonymous with "storage and conveyance."

We have demonstrated that there are various ways to advance the objective of water supply reliability. New storage and conveyance facilities are not necessarily the best or most effective means of achieving that goal. As crafted, the phasing document indicates that all of the common programs will be held hostage to "progress" in the areas of storage and conveyance. This is a highly inappropriate approach to developing a preferred alternative and inherently biases the process in favor of new water development facilities. The EIS/EIR fails to support the conclusion that new facilities are necessary to achieve the water supply reliability objective.

We have supported the notion of "phased decision-making" in the CALFED program. Unfortunately, the phasing document substitutes adoption of a preferred alternative prior to completion of technical analysis and demonstration of need. The phasing document is flawed for a variety of other reasons as well, not limited to the wholly inadequate discussion of assurances and financing. We will provide a more detailed critique of the August 7 version shortly. (It is our understanding that CALFED has retracted the ill-advised requirement that all comments on this draft be received within two working days.) Thank you for your consideration of our views.

Sincerely,

Cynthia L. Koehler
Save San Francisco Bay Association

Jean Auer
Environmental Water Caucus

Spreck Rosekrans
Environmental Defense Fund

Jackie McCort
Sierra Club

Hamilton Candee
Natural Resources Defense Council

Gary Bobker/Grant Davis
The Bay Institute

Zeke Grader
Institute for Fisheries Resources

Roberta Borgonovo
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Betsy Reifsnider
Friends of the River

Richard Izmirian
California Sportfishing Protection Alliance

Arthur Feinstein
Golden Gate Audubon Society

John Beuttler
Fishery Foundation of California

Martha Davis/Fran Spivy-Weber
Mono Lake Committee

P. Parravano
Pietro Parravano
Pacific Coast Federation of Fishermen's Associations

cc: CALFED Policy Group
CALFED Management Team

ATTACHMENT THREE

*American Land Conservancy * American Whitewater * Angeles Chapter, Sierra Club * The Bay Institute * Bluewater Network * Buena Vista Audubon Society * Butte Environmental Council * California Association of River Guides * California League of Conservation Voters * California Public Interest Research Group * California Sportfishing Protection Alliance * California Trout * California Wilderness Coalition * Campaign to Save California Wetlands * Center for Marine Conservation * Central Sierra Environmental Resource Center * Clean Water Action * DeltaKeeper * Earth Island Institute * Education for Sustainable Living * Endangered Habitats League * Energy Solutions * Environmental Defense Center * Environmental Defense Fund * Environmental Law Foundation * Environmental Protection Information Center * Environmental Working Group * Forestville Citizens for Sensible Growth * Fresno Audubon Society * Friends of the Los Angeles River * Friends of the Northern San Jacinto Valley * Friends of the River * Golden Gate Angling and Casting Club * Golden Gate Audubon Society * Golden West Women Fly Fishers * League of Women Voters California * Marin Audubon Society * Mono Lake Committee * National Audubon Society California * Natural Resources Defense Council * Northcoast Environmental Center * Northern California Council/ Federation of Fly Fishers * Pacific Coast Federation of Fishermen's Associations * Placer Group, Sierra Club * P.O.W.E.R. (Public Officials for Water and Environmental Reform) * Rural Canyons Conservation Fund * Sacramento River Preservation Trust * Salmonid Restoration Federation and Coast Action Group * San Diego Audubon Society * San Diego Chapter, Sierra Club * San Francisco Bay Keeper * San Joaquin Audubon Society * Santa Clara Valley Audubon Society * Santa Monica Bay Audubon Society * Save Our Shores * Save San Francisco Bay Association * Sierra Club California * Smith River Alliance * South Yuba River Citizens League * Southwest Center for Biological Diversity * Southwest Wetlands Interpretive Association * Surfers Tired of Pollution * Tri-County Conservation League, Inc. (Riverside) * Tuolumne River Preservation Trust * Urban Creeks Council*

October 15, 1998

Doug Wheeler
Secretary of Resources
Resources Agency
1416 Ninth Street
Sacramento, CA 95814

Robert Perciasepe
Assistant Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Re: CalFed's Preferred Alternative in Final Draft Environmental Impact Report/Statement

Dear Secretary Wheeler and Assistant Administrator Perciasepe:

The undersigned organizations write to communicate our opposition to CalFed's current support for expensive and environmentally damaging new dams and reservoirs.

Currently, the draft preferred alternative states "New or expanded surface storage will be constructed" provided a set of conditions is achieved. We oppose the presumption in favor of new surface storage because there is no compelling evidence supporting surface storage as superior to conservation or other strategies for improving water supply reliability for all users and the environment.

Instead, we urge you to adopt a preferred alternative which states that decisions regarding new or expanded surface storage will not be made until Phase II, and only then if proven

Why risk the harm of extracting even more water from our rivers to store for some later environmental use when less expensive and more environmentally-friendly alternatives exist to enhance stream flows?

- Options for improving instream flows which are more environmentally-friendly than new surface storage include water transfers (properly regulated to protect source watersheds), groundwater storage, and floodplain restoration.
- Building offstream reservoirs and enlarging existing dams directly degrades and destroys the environment by flooding and altering thousands of acres of land and accompanying imperiled habitats, including wetlands, creeks, grasslands, and forests.

We support the notion of "phased decision-making" in the CalFed program. CalFed's preferred alternative must promote getting the job done right, based on the best technical and economic analysis and sound science. Phase I should include the least costly and least environmentally damaging approaches to meeting CalFed's goals, including repairing the ecosystem to improve water quality for people and wildlife. We urge you to remove surface storage from Phase I and to change your presumption for new surface storage to one that would only build surface storage facilities if proven absolutely necessary.

Thank you for your consideration.

Sincerely,

Harriett Burgess
American Land Conservancy

John Gangemi
American Whitewater

Dr. Laurie Fathe
Angeles Chapter, Sierra Club

Grant Davis/Gary Bobker
The Bay Institute

Sean Smith
Bluewater Network

William D.Daugherty
Buena Vista Audubon Society

Lynn Barris/Barbara Vlamis
Butte Environmental Council

Craig Bell
California Association of River Guides

Sarah Rose
CA League of Conservation Voters

Andy Igregas
CA Public Interest Research Group

Richard Izmirian/Jim Crenshaw
CA Sportfishing Protection Alliance

Nick Di Croce
California Trout

Joan Reiss
California Wilderness Coalition

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Placer Group, Sierra Club

Dorothy Green
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Ray Chandos
Rural Canyons Conservation Fund

John Merz
Sacramento River Preservation Trust

Jud Ellinwood
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Carolyn Chase
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Jim Rowoth
San Joaquin Audubon Society

Craig Breon
Santa Clara Valley Audubon Society

Charles G. Bragg, Jr.
Santa Monica Bay Audubon Society

Vicki Nichols
Save Our Shores

Cynthia Koehler/Barry Nelson
Save San Francisco Bay Association

Bill Craven
Sierra Club California

Larry Moss
Smith River Alliance

Shawn Garvey
South Yuba River Citizens League

Allison Rolfe
Southwest Center for Biological Diversity

Patricia W. McCoy
Southwest Wetlands Interpretive Association

Donna Frye
Surfers Tired of Pollution

Jack L. Bath
Tri-County Conservation League, Inc. (Riverside)

Tim Ramirez
Tuolumne River Preservation Trust

Carole Schemmerling/Joshua Bradt
Urban Creeks Council

ATTACHMENT FOUR

BLUEPRINT FOR AN ENVIRONMENTALLY AND ECONOMICALLY SOUND CALFED WATER SUPPLY RELIABILITY PROGRAM

November 5, 1998

Save San Francisco Bay Association
Natural Resources Defense Council
The Bay Institute of San Francisco
Environmental Defense Fund
Natural Heritage Institute
Sierra Club
California Trout
Public Officials for Water and Environmental Reform
League of Women Voters of California
Center for Marine Conservation
Mono Lake Committee
Clean Water Action
California League of Conservation Voters
California Sportfishing Protection Alliance
Pacific Coast Federation of Fishermen's Associations
Friends of the River
Marin Conservation League
Sierra Nevada Alliance
Earth Island Institute

INTRODUCTION AND SUMMARY

The mission of the CALFED Bay-Delta Program is to develop a comprehensive plan to restore the ecological health and improve management of water in the San Francisco Bay-Delta system for all beneficial uses. While CALFED has made substantial progress toward a program for restoring ecological health, it has struggled with developing a water supply reliability program and has confronted serious disagreements regarding the need for new surface storage facilities. The time has come to move forward with creative, viable solutions.

A viable CALFED solution must do more than restore the health of the Bay-Delta ecosystem. It must also improve the reliability of water supply for California's urban and agricultural economies. This blueprint articulates our assumptions and concerns, and outlines our recommendations for developing an affirmative program for improving water supply reliability.

We're committed to finding a CALFED solution that works for all of California.

Our Assumptions:

- **Defining "reliability."** What matters is the economic utility of water, not solely how much is delivered or diverted from the Delta. CALFED has confused quantity with water reliability. CALFED should adopt the following definition of water supply reliability:

  Improving the predictability and availability of economic benefits derived from water while restoring ecosystem health in the Bay-Delta estuary and watershed.

CALFED also should focus on providing water users with an economically and environmentally sound suite of dry year reliability strategies.

- **Let's be fair.** There are fundamental inequities in California water. Some water users pay a lot for the water they receive and others pay little or nothing. Some are contributing to Bay-Delta restoration, while others are not. Some meter their water use and prepare and implement conservation plans. Others do not. Some have very reliable water supplies. Others do not. While CALFED did not create these problems, it must address them.

- **Ecosystem restoration improves water supply reliability.** Restoration of the Bay-Delta ecosystem is the foundation of all efforts to improve water supply reliability. As long as species and habitats continue to decline and be degraded, we will continue to contend with regulatory uncertainty.

- **There is no "new" water.** There is a finite amount of water in the system. What some have called, "new" water is, in fact, further reallocation of water from the environment. The ecosystem has been depleted to the point where its resources are crashing. We can use our current supplies better, rather than trying to build our way out of our problems.

- **First, do no harm.** Any water supply reliability activities undertaken pursuant to a final CALFED decision should support full ecosystem recovery and should not cause further ecosystem degradation.

- **Price matters.** No one, especially the taxpayer, wants to pay more than needed to solve these problems. In addition, moving aggressively towards pricing that reflects the economic and environmental value of water will encourage efficient water use.

Our Concerns

- **Baseline, Baseline, Baseline.** CALFED has not provided a clear and accurate picture of historic and current water supply, demand or use by any sector. Defining an accurate and comprehensive "baseline" is a critical issue not only for purposes of clear accounting, but because inaccurate claims and beliefs are driving policy decisions.

- **Dams or No Dams? Wrong Question.** Unfortunately, the past year has been characterized by a divisive preoccupation with arguments for and against the construction of new surface storage. The issue of surface storage has somehow become divorced from the key questions CALFED was created to answer: how best to restore the ecosystem and reliability of water supply and water quality. CALFED should begin its stage 1 program by implementing environmentally and economically sound water supply reliability tools, such as groundwater storage, transfers, conservation and reclamation, to produce near-term benefits and inform long-term decisions about water supply. Although we do not support CALFED's current presumption regarding the need for new surface storage, we believe that surface storage should continue to be evaluated in light of the potential benefits of the water supply reliability tools described in this document.

- **"Let's Get Better Together" Has Become Code For "If I Don't Get Better, Neither Should You."** This 'quid pro quo' philosophy ignores the fact that the interests do not come to the table as equal players – the ecosystem is on the verge of collapse, while the agricultural and economic sectors have continued to thrive.

- **More of the Same is Not the Answer.** The ecosystem has borne the brunt of conventional water development for more than a century. There is no better reason for looking for a new approach.

Our Water Supply Reliability Program

This blueprint discusses a variety of water supply reliability tools. The table below summarizes a preliminary range of yield and storage which could be produced by these tools and which should be shared between the environment and consumptive water users.

Table 1: Preliminary Summary of Potential Water Supply Reliability Strategies*

	Strategy	Potential Yield (acre-feet)
Demand side	Irrigation efficiency	340,000-1,700,000
	Voluntary fallowing (dry year, rotational, permanent, etc.)	420,000-2,100,000
	Water acquisitions and transfers	Composite of irrigation efficiency, fallowing, groundwater and others.
	Full implementation of urban BMPs	1,500,000
	Improved landscaping requirements	520,000 -1,400,000
	More efficient washing machines	97,000-194,000
	Commercial ultra low flow toilets	200,000
	Existing residential indoor BMPs above MOU-specified levels	300,000
	Existing commercial, industrial and institutional BMPs above MOU-specified levels	350,000-650,000
	Reclamation and recycling	1,170,000-1,720,000
Supply side	Groundwater banking and management	900,000-1,000,000
	Delta reoperation	122,000-137,000
	Upper watershed restoration	No estimate available yet.
	Flood reservations	400,000-600,000 (Storage)

* As discussed above, CALFED's water supply reliability program must provide water to support Bay-Delta ecosystem recovery. This will require substantial amounts of water. Improving Delta flow conditions in Stage 1 may require 123,000-372,000 acre-feet. Further improvements for upstream areas and Suisun Marsh will require additional water.

These preliminary figures are not additive. However, these tools offer the potential to go far beyond what CALFED has considered to date and could generate millions of acre feet of water for all users. They can form the basis for an environmentally and economically sound water supply reliability program. Section 3 discusses each of these strategies in greater detail.

This blueprint is focused primarily on tools to generate water supply reliability benefits. Further work needs to be done on programs to address water quality and other program objectives. However, it is clear that by developing a water reliability strategy by using above water supply tools, CALFED can help meet its other program goals. An approach which truly produces multiple beneficiaries is most likely to prove cost-effective.

Our Preliminary Recommendations

We applaud CALFED's effort to begin identifying specific actions for Stage 1. However, the measures proposed in CALFED's draft preferred alternative document reflect a bias in favor of new surface storage and a tepid effort on alternative approaches. In contrast, we propose a set of Stage 1 actions in Section 4 that emphasizes:

- Maximizing conservation and recycling potential;
- Jumpstarting groundwater management and appropriate storage;
- Facilitating appropriate water transfers;
- Ensuring environmental water reliability;
- Improving the operation of existing dams and canals;
- Developing a comprehensive water supply/demand baseline ;
- Developing realistic modeling assumptions; and
- Pricing water to reflect its true economic and environmental value.

Our Commitment

Our organizations are committed to fixing the environmental and water management problems in the Bay-Delta Estuary. We believe that CALFED's original approach – to address these problems in a broadly-supported, comprehensive package – is correct. We invite all stakeholders and public officials to join us in a productive dialogue to craft a solution that brings Californians together.

SECTION I: OBJECTIVES FOR WATER SUPPLY RELIABILITY

A. CALFED Has Failed to Adequately Define Water Supply Reliability

CALFED currently defines its water supply reliability objective as:

> Reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system. This strategy seeks to: reduce the mismatch between supply and beneficial uses through a variety of actions; reduce the impacts of water diversion on the Bay-Delta system; and increase the flexibility to store and transport water. (Phase II interim report)

This objective is impossible to measure, in sharp contrast with the intense efforts to quantify the goals of the ecosystem restoration program and to develop measurable targets. In addition, the current CALFED approach to water supply reliability fails to:

- **Recognize that the price of water has an effect on both the demand for water and the supply of water.** As the cost of developing additional water supplies increases, demand for water will decrease and other sources of water (e.g. transfers and conservation) will become even more competitive. CALFED has not adequately integrated core economic principles and analysis into its water supply reliability planning.

- **Establish a level playing field between strategies focused on supply and demand.** If increased storage is itself an objective, then demand side strategies, no matter how successful, are doomed to be inadequate. CALFED has assumed a very limited approach to demand-side management, overstated future demand (see Section II), and then concluded that new reservoirs are "necessary" to meet the reliability goal. Indeed, CALFED has gone so far as to identify increased storage as a specific program objective, rather than identifying storage as a means (on a par with conservation and other options) for attaining the reliability goal, thus creating an inherent bias.

- **Integrate the role of the environment in determining water supply reliability.** Healthy aquatic ecosystems require water supplies of adequate quantity, quality and timing. CALFED's definition of reliability fails to reflect these needs. Nor does it reflect the increased water supply reliability that would accrue to water users once the ecosystem has achieved a level of health and sustainability. By ignoring environmental requirements, and the reliability implications of environmental degradation, CALFED's reliability objective biases the program in favor of strategies which are the least compatible with ecosystem health.

B. CALFED Should Redefine Its Water Supply Reliability Goals

CALFED's water supply reliability program must contribute to the long term health of the urban, agricultural and fishing industries which depend on the Bay-Delta, as well as the environment. It is our view that **water supply reliability is more accurately defined as improving the predictability and availability of economic benefits derived from water, while restoring ecosystem health in the Bay-Delta estuary and watershed.** We propose to shift CALFED's reliability objective from its limited focus on increasing absolute amounts of water available for consumptive use to increasing the predictability of benefits. More water is only one of many ways to achieve such predictability. In fact, during the 1987-1992 drought, maximizing water deliveries resulted in drained reservoirs, devastated fisheries and decreased predictability. Our definition of water supply reliability includes three major component objectives:

1. Improve the long term economic benefits of water supply to sectors of the California economy dependent on Bay-Delta water supplies.

CALFED should recognize the ability of individual water users to utilize both supply- and demand-side strategies. Supply alone fails to provide predictability of benefits and fails as an adequate measure of reliability. For example, growers can adapt to lower dry year contract supplies through conservation and water transfers. By providing a range of viable water reliability strategies, CALFED could help maintain the long-term profitability of a given grower, even if dry year contract deliveries remain unchanged. The bottom line for agricultural, municipal and industrial users is not unit of water delivered, but rather the benefits derived. [1]

Measuring economic benefits by sector will provide a valuable indication of the true value of water supplies. Such an approach will also adjust for regional variances. Finally, we recognize that tying the water supply reliability objective to economic benefits is complex, since a variety of factors affect economic well being (e.g. interest rates and market conditions). However, this is no different than CALFED's proposals for measuring ecosystem health, which is similarly dependent upon factors outside the control of the CALFED program.

2. Improve predictability of water availability to individual water users and districts in dry years.

A program focus on assuring long term economic productivity will go a long way toward ensuring the adequacy of water reliability. However, we recognize that it may not be fully adequate to address water needs during particularly dry years. Under the current water management regime, the next drought is likely to result in further ecosystem

[1] We believe that this economically-oriented objective incorporates the provision of adequate supplies for basic indoor domestic water use. Moreover, adequate drinking water supplies are not a limiting factor in achieving water supply reliability.

degradation and unpredictability for consumptive water users. CALFED should attempt to increase the predictability of water availability during dry years. Volume of contract deliveries alone is inadequate to measure dry year predictability.

The limits of using contract deliveries as a measure of success is amply demonstrated by the continued productivity of Central Valley agriculture during the 1987-1992 drought, despite reductions in contract deliveries. CALFED should adopt an objective that focuses on water availability to individual water users and districts, rather than the current focus on water contract deliveries to regions. Such dry year strategies could include dry year supplies from conjunctive use programs, water transfers, voluntary fallowing, conservation, purchased storage in existing surface reservoirs and more, in addition to contract deliveries. Strategies to increase the predictability of dry year supplies should not be designed to prevent any change in water use during dry years. Rather, they should be designed to reduce dry year impacts and provide options for water users. In the context of these options, we expect that some individual water users and districts will choose to enter dry year water markets as sellers and others as purchasers. Encouraging well-informed decisions by water users among a variety of options is perhaps CALFED's best strategy to promote efficient water use and reduce impacts during times of shortage.

In practical terms, there is a major difference between solutions that improve dry year benefits and those that improve average year benefits. For instance, water transfers designed to increase reliability in dry years (e.g. dry year options) can help keep agricultural land in production. These same market strategies can be used to increase long term supplies, through voluntary agricultural land retirement. Whatever the merits of retiring a given piece of agricultural land, tools targeted at average supplies and dry year reliability have very different effects.

As discussed in section 3, many strategies could provide increased predictability in dry years. As CALFED further develops these strategies, it should develop an approach that provides adequate evaluation and measurement of the access which individual water users and districts have to strategies to improve reliability during dry years.

3. Assure that the water supply reliability program actively promotes CALFED's ecosystem restoration goals.

It is essential that CALFED recognize the water supply reliability benefits of achieving its ecosystem restoration objectives. The recovery of endangered species, for example, would dramatically increase the predictability of water supplies. In addition, CALFED's water supply reliability program must support -- rather than compete with -- the flow improvements necessary to achieve the ecosystem restoration objectives. In short, CALFED's water supply reliability program must do more than simply reduce environmental impacts (as stated in the current CALFED definition). It must be fully integrated with the ecosystem restoration program. Such an approach will better serve both the environment and water users.

This has significant ramifications for the water supply reliability objective. For example, increasing operational flexibility for consumptive uses without also using that flexibility to meet the objectives of the ecosystem restoration program is likely to result in further environmental degradation, thereby reducing reliability. CALFED's water supply reliability program must provide reliability for the environment, not merely for water users. It is now widely accepted that the attainment of water supply reliability and ecosystem restoration are inextricably linked; this linkage must be formally recognized in the objectives that guide CALFED.

CALFED can evaluate progress towards this reliability objective by measuring specific contributions to the attainment of objectives for endangered species recovery, desired annual hydrograph, in-stream flow improvements, and other components of the CALFED ecosystem restoration program. Attainment of these objectives will result in increased reliability for all water users.

It is important to note, however, that unpredictability of water supplies which results from slow progress in attaining ecosystem restoration goals should not be used as a rationale for reducing ecosystem restoration funding, or for constructing new surface storage facilities which could result in further ecosystem damage.

SECTION II: WATER SUPPLY IN CONTEXT

CALFED's water supply reliability program is being driven in part by flawed notions about what current and future demand for consumptive use of water is and will be, and concern that environmental protections have had substantial impacts on agricultural and urban water users. Indeed, CALFED appears to be taking seriously claims that these relatively modest protections have caused actual water shortages. The purpose of this section is to provide historic context for current and projected water demand, and to provide an alternative perspective of the "water costs" associated with environmental protections by using actual Delta export data.

A. Historical Overview

In California's Central Valley watershed, developed water use has steadily increased over the last 150 years and has substantially reduced instream flows. In the San Francisco Bay/Delta the impacts of this development have been exacerbated by the export of much of the remaining freshwater inflow to the San Joaquin Valley, the Tulare basin and the Los Angeles basin. As these exports have increased over the last 30 years, the fishery populations have plummeted. Many aquatic species now qualify for Endangered Species Act (ESA) protections. Figure 1 summarizes the concurrent decline of fish populations along with increased Delta exports from 1967-1996.[2]

Over the 20-year period from 1975-1994, water users south of the Delta exported about 4.6 million acre-feet (AF) on average. However, exports steadily increased over this time frame reaching a record high of 6.1 million AF in 1989, notwithstanding a series of very dry years in the late 1980s and early 1990s. Indeed, total Delta outflow was less than 35 percent of estimated unimpaired flows for four straight years 1988-1991.[3]

State and federal governments began to consider and implement environmental protections under the CVPIA, the federal and state clean water acts and endangered species statues in the early 1990s. Various studies have been generated purporting to demonstrate that these limited environmental protections have had, and will have in the future, enormous water supply impacts. Recent claims have been over 2 million acre feet per year.

However, it is essential that the CALFED solution be based on clear and accurate information. Close analysis reveals that the water supply impacts of environmental protection are relatively modest -- certainly no more than the water users felt was reasonable when they signed the Bay-Delta Accord four years ago. We base this conclusion on the tables 2 and 3 of this section. These tables analyze the impact on Delta

[2] DWR's DAYFLOW database is the source of all Delta export and outflow values in this Appendix. CDFG's data for fish passage at Red Bluff are used for population values for salmonids and steelhead. Midwater trawl data is used for population values for Delta smelt, longfin smelt and striped bass.

[3] Unimpaired flow data provided by DWR.

exports of environmental protections against two different baselines; actual exports and a modeled projection of exports assuming a 1995 level of demand and the D-1485 standards.

The water supply "impacts" of environmental protections are correctly characterized as "the loss of historic supplies to consumptive users." Thus, the best way to define the baseline for determining such impacts is actual historic export levels.[4] Comparing projected operations under environmental protections with exports that have actually taken place provides the most realistic assessment of potential impacts. Nevertheless, we have included here analyses of water supply impacts associated with environmental protections using both historic (actual) data and DWR's projected future definition of baseline. We have compared these two baselines with the same regulatory regime -- the current environmental protections afforded by the CVPIA, the 1995 Water Quality Control Plan and ESA criteria. Results of this comparison are illustrated in tables 2 and 3.

Table 2
Delta Export Comparison
Baseline: Actual Exports
(all values in TAF)

	Baseline: Actual Exports	Current Regulatory Conditions: Projected Exports under ESA, WQCP, CVPIA (DWRSIM Study 549new)	
Period	Average	Average	Difference from Actual
October 1975 - September 1994	4596	5297	701
June 1986 - September 1992	4979	4328	-651

Table 3
Delta Export Comparison
Baseline: DWRSIM D1485 Study
(all values in TAF)

	Baseline: Projected Exports Under D1485 (DWRSIM Study 693)	Current Regulatory Conditions: Projected Exports under ESA, WQCP, CVPIA (DWRSIM Study 549new)	
Period	Average	Average	Difference from Actual
October 1975 - September 1994	5843	5297	-547
June 1986 - September 1992	5257	4328	-929

[4] South of Delta deliveries are sometimes used to estimate impacts in place of Delta exports.

Table 2 looks at projected levels of export under the current environmental protections compared with actual historic exports. Historic annual exports from the Delta were about 4.6 million AF on average (1975-1994). The current relatively limited environmental protections have not resulted in major adverse impacts on historic levels of export. On the contrary, with current environmental protections in place, under a repeat of the 1975-1994 conditions, Delta exports would be about 5.3 million AF -- or about 700,000 AF more per year than the water users actually exported on average.

Nor is it the case that current environmental protections would result in unreasonable impacts during prolonged drought periods. Table 2 demonstrates that during the most recent prolonged drought period (June 1986-September 1992), actual Delta exports were about 4.97 million AF. During a repeat of these conditions, with the current environmental protections in place, south of Delta exports would be about 4.3 million, or a decrease in annual average exports of about 650 TAF. While this is not an insignificant amount, it is well below estimates of the water costs associated with environmental protections. Even more significantly, it is well below what the water users themselves determined was "reasonable" when they signed the Bay-Delta Accord four years ago.

Table 3 looks at these water costs using a different baseline -- an entirely hypothetical modeling projection that does not reflect exports ever provided to south of Delta exporters. As discussed above, DWR has assessed the "impact" of environmental protections using a baseline that assumes a 1995 level of demand and the D-1485 standards. (We emphasize that we are aware of no justification or support for the notion that this level of demand somehow represents an absolute entitlement such that any level of export below this level counts as an "impact".) Nevertheless, even under this questionable baseline, projected water costs of current environmental protections is far below many water user claims. On average, DWR's study demonstrates that under its hypothetical baseline Delta exports would be about 5.8 MAF annually. With environmental protections in place, projected exports would decrease by about 547 TAF -- or less than 10%. In a repeat of a lengthy drought, exports could decrease from 5.2 MAF to 4.3 MAF, or about 929 TAF.

We do not discount the significance of this drought period estimate. However, this worst case scenario is again well below the highly inflated claims that are routinely employed in the CALFED process to justify immediate construction of new dams and surface reservoirs -- and again below the level of impact the water users agreed to in signing the Bay-Delta Accord. It is worth noting that the environmental criteria reflected in these DWR studies include a broader ranger of protections than those used for purposes of the Bay-Delta Accord "impact" modeling. Thus, it now appears that the combined water supply impact of the ESA, CVPIA and Water Quality Control Plan protections is somewhat less than the anticipated water costs of the Bay-Delta Accord alone. If nothing else, this fact indicates that CALFED must use great caution in premising its water supply

reliability program on modeled projections and any such studies must receive careful and comprehensive review.

Additionally, it is critical to acknowledge that the limited water supply impacts of current (critically needed) environmental protections have not resulted in water shortages. When subsidized water has been less than fully available, the water users have been able to avail themselves of water on the open market. For example, during the drought of the late 1980's and early 1990's, Westlands Water District secured additional water supplies through many of the water supply reliability tools analyzed in Section 3, including water transfers and improved water conservation practices. Over the five year period from 1990 to 1994, despite reductions in the amount of federally subsidized water it received, Westlands was able to adapt and maintain very productive crop yields and gross crop values. Given the existence of adequate tools that we propose, water users will have substantially improved access to water.

In other words, even in dry years, the water users have not lost water supply -- they have simply experienced reductions in water subsidies. As discussed further in section 2, this is appropriate public policy because it will encourage more efficient use of water. A healthy and appropriate water transfer market, as well as the other tools discussed in Section 3 will mean that what the water users may lose in subsidies they will more than make up in increased reliability.

Finally, not every reduction in water supply, or the availability of subsidized water, can be laid at the door of environmental protection. Under California's appropriative rights system, in some years drier weather alone will trigger shortages for those districts that have the most junior status, even though other more senior water users will receive full contract supplies.

B. Overestimating Current and Future Demand

The assumptions used by CALFED to estimate urban water demand are based on questionable projections from DWR's Bulletin 160-98 which dramatically overestimate current and projected demands for consumptive use, and underestimate savings from current and projected water conservation strategies. Among the program's faulty assumptions:

- Current water demand is overstated by up to 1.2 million acre-feet. Demand projections for 2020 are based on this inaccurate baseline.

- Errors in forecasting methodology underestimate water availability by hundreds of thousands of acre-feet.

- 2020 urban demand is overstated by an additional one million acre feet because of the failure to include all applied water reductions as reductions in future demand.

In light of these problems, CALFED should also reevaluate its assumptions regarding agricultural water demand before proceeding with further analysis. In all cases, demand responsiveness to price, must be fully integrated into the supply/demand assessment, upon which CALFED's assessments are based.

Figure 1(a)
Historic Delta Exports and Fish Populations
(population data available only since 1967)

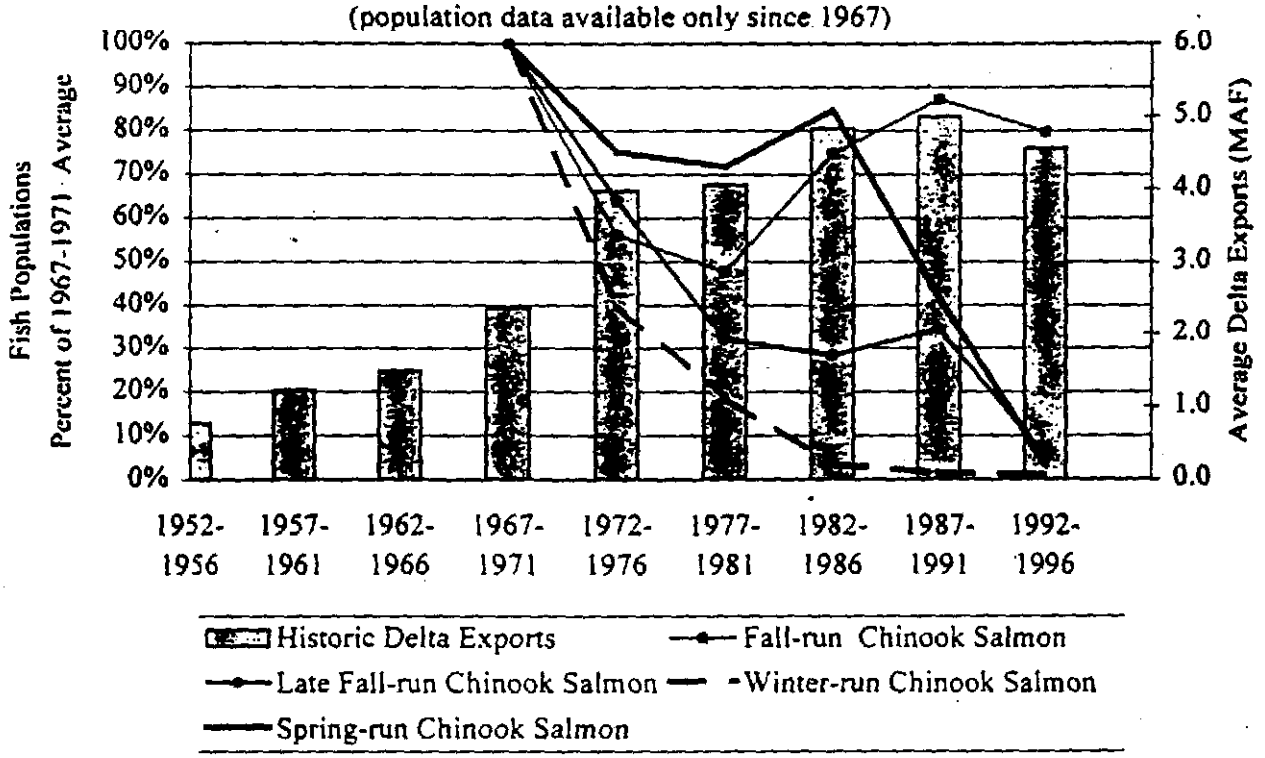
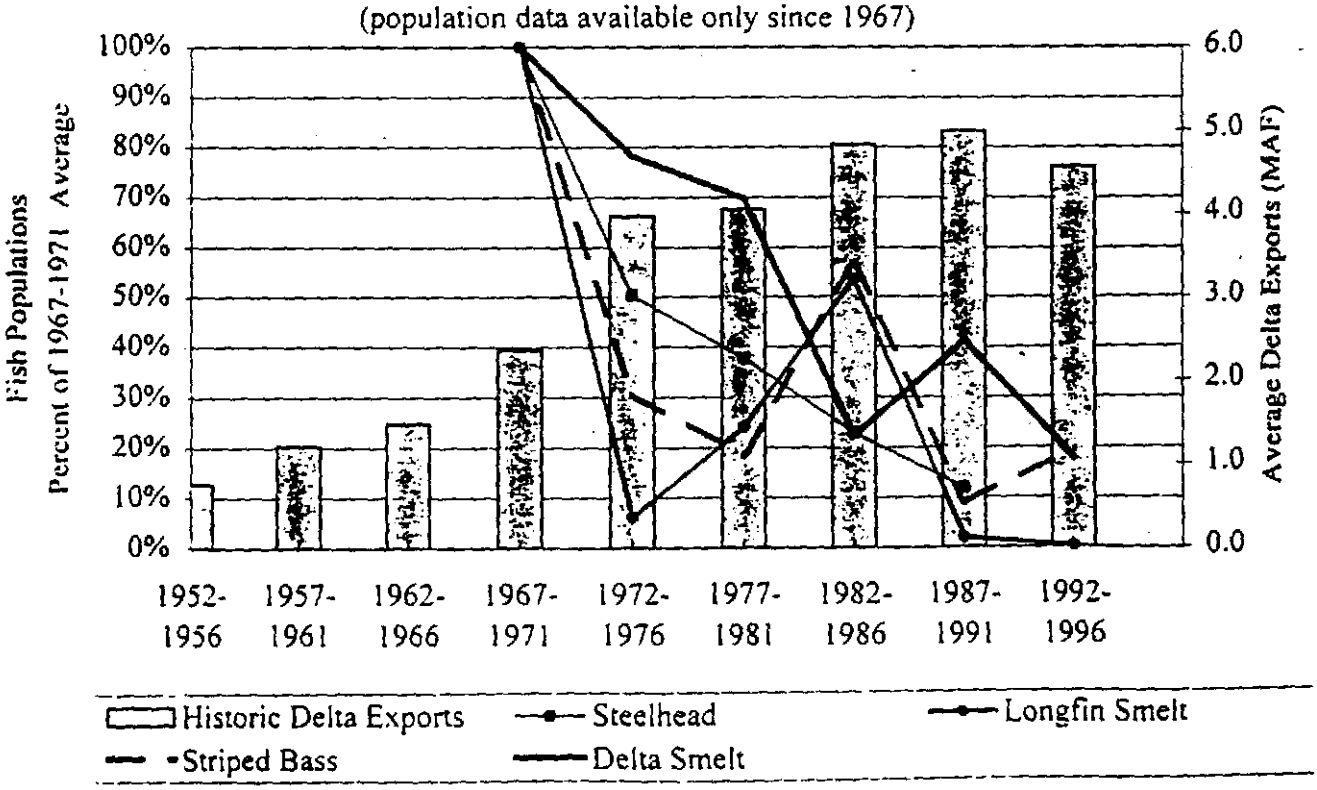


Figure 1(b)
Historic Delta Exports and Fish Populations
(population data available only since 1967)



SECTION III: ACHIEVING WATER SUPPLY RELIABILITY WITHOUT NEW DAMS

CALFED has not adequately analyzed the potential for alternatives to new dams and surface reservoirs to provide water supply reliability. This section initiates a fuller discussion of these options. The analysis below is preliminary and is based on the limited data available to our organizations. The figures provided are a rough approximation of the water supply that could be saved or made available through "soft path" means and other approaches compatible with ecosystem restoration.

This analysis is not a definitive or exhaustive discussion, but should provide the CALFED Policy Group and staff with a starting point. Clearly a thorough investigation of the issues raised in this section must be conducted before CALFED commits itself any further to a "presumption" that new surface reservoirs are required to attain the water supply reliability objective. We have not, for example, performed an economic analysis of these alternatives. We continue to urge CALFED to complete such an analysis before making decisions regarding the need for new storage and conveyance projects. We believe that the results of this analysis will demonstrate that the strategies outlined below provide the basis for an environmentally and economically sound water supply reliability program. We further believe relying on the diverse mix of water management tools discussed below will reduce system vulnerability, as well as reduce the risk that CALFED will create stranded assets by constructing expensive facilities to which cheaper alternatives exist.

In the future, we will present our recommendations for the CALFED water quality and system vulnerability programs. The measures discussed below will comprise one part of our water quality recommendations, as we believe that implementation of these measures, such as improved agricultural irrigation efficiency, voluntary land retirement, watershed restoration and water reclamation, can offer substantial water quality benefits. In addition, as we have previously recommended, implementation of measures to address Delta subsidence can reduce system vulnerability and improve water supply reliability.

The discussion below is divided into four subsections. First, we discuss the need for a foundation of baseline information and appropriate financing tools for a water supply reliability program. Second, we discuss demand strategies to better utilize existing developed water supplies. Third, we address "supply side" strategies which could be conditioned to provide water supply benefits for urban and agricultural water users, as well as the environment. Fourth, we discuss some of the flow-related ecosystem requirements which the water supply reliability program must address. We believe that implementation of the CALFED water supply reliability program, particularly the "supply side" strategies discussed below, must be formally linked with assurances that ecosystem flow and other requirements will be provided. Specifically, the environment should benefit directly from the implementation of each water supply reliability tool discussed below. We propose the following package of potential strategies:

A. A Water Supply Reliability Foundation

A solid foundation of reliable information and financing is a key to the ultimate success of the CALFED water supply reliability program.

1. Developing a Baseline and a Water Budget

CALFED should develop and implement a comprehensive budget for use of the Bay-Delta's waters. Exports and diversions from the system have increased over time, and, the total amount of withdrawals and depletions has not been adequately measured. Such a budget would provide the comprehensive information needed to make well-informed decisions. It could also promote ecosystem restoration and sustainable economic use. Such a budget will require an accurate and comprehensive water use measurement and reporting program.

2. Modeling Assumptions

The modeling for CALFED's "no action" alternative assumes that the CVP and the SWP will make full deliveries of contracted supplies in the future. As discussed above, such deliveries would be inconsistent with existing law (e.g. ESA, CWA, CVPIA), CALFED's ecosystem restoration goals and "no redirected impacts" principle. By building these increased deliveries into the "no action" alternative, the modeling masks the potential environmental impacts of CALFED's water supply reliability alternatives. Correcting this assumption is essential for CALFED to weigh accurately the benefits and impacts of a final CALFED package. In addition, correcting this assumption is essential to comply with CALFED's commitment not to balance the state water budget on the back of the Delta.

3. Financing and Pricing

Past water pricing policies have consistently understated the "true cost" of water development through financial subsidies and by failing to assign economic cost to ecosystem destruction. These policies have combined to inflate expectations, create a perception of shortages and encourage environmentally damaging water development.

To avoid such problems in the future, CALFED should adopt a comprehensive pricing strategy that ensures that all water supply alternatives incorporate in full their associated economic and environmental costs. In particular, direct beneficiaries should pay the full planning and construction cost of any new storage or conveyance facilities.

In addition, CALFED's financing package must address the unmet mitigation obligations of water users. This should include, for example, a set of surcharges on water use and development in the Bay-Delta system to assist in ecosystem restoration and the dedication of a share of any new water supply facilities to ecosystem restoration.

B. Demand-Related Strategies

1. Agricultural Water Conservation

Improve irrigation efficiency. Agriculture uses over 80% of the developed water supply in California. Relatively small changes in agricultural demand can yield tremendous quantities of water. For example, a small reduction in the percentage of applied water lost to evaporation by switching to more efficient technology, or by improved irrigation scheduling, can yield significant water savings.

Evaporative losses are irretrievable and a non-productive use of water. Flood irrigation is estimated to lose 20 to 30 percent to evaporation from open water surfaces and transpiration by weeds.[5] Evaporation losses from sprinkler systems, which are currently used on approximately 35 percent of the irrigated acreage in California,[6] are estimated to be as high as 9 percent, while micro-irrigation systems are estimated to have minimal evaporative losses.[7] Overall, a one to five percent reduction in agricultural demand due to reduction in evaporative losses or other changes in water use could generate 340,000 - 1,700,000 acre-feet.[8] These changes in irrigation practices could also have a substantial positive impact on water quality by reducing surface runoff and subsurface drainage.[9]

Increase use of market-based incentives. A voluntary program of compensated dry year fallowing of agricultural lands (dry year options) could generate a substantial dry year water supply. For example, dry year fallowing of 5 to 15 percent of the land currently used to grow alfalfa, pasture forage and cotton in the Central Valley and Colorado River regions could potentially generate 400,000 to 1.2 million acre-feet in those years.[10] These reductions are based on evapotranspiration rates and constitute reduction in consumptive use. Reductions in the volume of applied water are even greater, yielding additional environmental benefits. The CVPIA Least Cost Yield study reached similar conclusions, finding that 1.24 million acre feet of non-CVP consumptive use could become available through voluntary land fallowing "capped" at 20 percent of existing use in the Central Valley. Estimated costs range from $55 to $255 per acre foot.[11] The same report found that 300,000 acre-feet could be made available within the CVP service area. Applying

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[5] Peter Gleick et al, *Review of the CALFED Water Use Efficiency Program Technical Appendix* (Pacific Institute for Studies in Development, Environment and Security, Oakland: 1998) p. 20.

[6] David Sunding, et al., "The Costs of Reallocating Water From Agriculture,: University of California, Berkeley, 1994.

[7] Greg Young and Steve Hatchett, "On-Farm Irrigation System Management," Technical Memorandum, June 6, 1994, p. 3-2.

[8] Based on 1995 average year agricultural water use, as reported in Bulletin 160-98, p. 1-20.

[9] Ronnie Cohen and Jennifer Curtis, *Agricultural Solutions: Improving Water Quality in California Through Water Conservation and Pesticide Reduction* (NRDC, San Francisco: 1998).

[10] This estimate was derived based on crop acreage by region from Bulletin 160-98, and average crop ET by region from Bulletin 160-93. The actual yield of dry year options must be adjusted to consider irrigation prior to the exercise of an option and potential dry year supply shortages.

[11] CVPIA Least Cost Yield Program, 1995.

the same methodology to the consumptively used portion of the Imperial Irrigation District's water supply would produce another 600,000 acre feet, for a total of up to 2,140,000 acre-feet. A reasonable minimum estimate of dry year fallowing can be obtained from the 1991 drought water bank. In that year, 420,000 acre-feet of "no irrigation" contracts (exclusive of "groundwater exchange and multiple response") were signed by DWR.[12]

Voluntary, compensated retirement of marginal quality lands on the west side of the San Joaquin Valley will have multiple benefits that could help meet the CALFED objectives in many areas, including water quality, water supply reliability, and ecosystem restoration. CALFED's preliminary analysis showed that a voluntary program of compensated land retirement could generate as much as 1.5 million acre-feet of water at an average cost of $150 per acre foot. This cost is significantly less than the projected costs of many other water supply augmentation options currently under consideration.

The 1990 joint federal-state "Rainbow Report" forecast that, by 2040, 460,000 acres of San Joaquin Valley lands would be significantly drainage impaired.[13] It recommended a suite of actions, including land retirement, in its drainage management plan. Even assuming the full accomplishment of the other measures, such as conservation and reduction of deep percolation, the Rainbow Report recommended that 75,000 acres be retired from willing sellers. Assuming an average allocation of 2.5 acre-feet per acre, and assuming that .5 acre-feet per acre is necessary for subsequent land management activities, retiring this amount of land from willing sellers could generate 150,000 acre-feet of water. Voluntary retirement of 75,000 acres is projected to occur pursuant to the CVPIA, even in the absence of a CALFED solution. Voluntary land retirement above this amount can further contribute to the CALFED solution.

These figures are preliminary only, and provided here for illustrative purposes. The degree to which market-based voluntary dry year fallowing and voluntary land retirement should be implemented, and under what conditions, deserves far more exhaustive analysis than CALFED has undertaken to date. CALFED must conduct a serious examination of these options.

2. Urban Water Conservation

The urban element of the CALFED water use efficiency program is based largely on full implementation of the Memorandum of Understanding Regarding Urban Water Conservation (MOU) – which is expected to generate 1.5 million acre feet of demand reduction by 2020.[14] While the CALFED documents recognize that implementation of

[12] "California's 1991 Drought Water Bank: Economic Impacts in Selling Regions," (Rand, 1993).
[13] San Joaquin Valley Drainage Program, 1990. *Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley*, U.S. Department of Interior and California Resources Agency, Sacramento, California.
[14] Department of Water Resources, Bulletin 160-98: The California Water Plan Update, (Sacramento: 1998) p.4-16.

the MOU should comprise the "floor" or base level of conservation, rather than a ceiling, the CALFED program makes little effort to quantify, let alone pursue, the substantial conservation savings that exist above the level to be obtained by full implementation of the MOU. Some of the available savings are described below.

Promote low water use landscaping and more efficient irrigation. Landscaping represents 30 to 60 percent of urban water use water use.[15] According to CALFED, urban water use amounts to 8.7 million acre-feet. Total water use for landscape purposes therefore ranges from 2.6 to 5.2 million acre feet. Landscape water audits, timers, and xeriscape could reduce landscape water use by approximately 10 to 15 percent. Greywater systems or rain cisterns can conserve much or all of landscape water use in individual applications. Statewide, a 20% reduction in landscape water use would yield 520,000-1,400,000 acre-feet.[16] Because the Urban MOU targets a limited number of customers for landscape water audits, even full implementation of the MOU will generate only a small portion of these total potential savings from landscape conservation.

Retrofit homes with more efficient washing machines. Replacing 50 to 100 percent of the average washing machines in use in 1995 with currently available horizontal axis washing machines could generate 97,000 to 194,000 acre-feet.[17] Future savings could increase further as even more efficient models come on the market. Because a BMP for horizontal axis washing machines was only recently added to the MOU, these potential savings are not yet reflected CALFED's estimates of potential urban water conservation savings.

Retrofit businesses and institutions with commercial Ultra Low Flow Toilets (ULFTs). According to a 1997 study by the Urban Water Conservation Council, savings from commercial ULFT retrofits ranged from 16 to 57 gallons per day (gpd), with wholesale establishments saving 57 gpd, and food stores and restaurants saving approximately 48 gpd.[18] Statewide savings from retrofits could yield 200,000 acre-feet, assuming that 5 million retrofits occur with average savings of 35 gpd.

Implement existing BMPs for residential indoor use at levels above MOU specifications. A substantial additional increment of cost-effective conservation is achievable by implementing existing BMPs above the levels specified in the Urban Water Conservation MOU. For example, potential savings from 4 indoor residential measures alone (ULFTs,

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[15] DWR Bulletin 160-93 notes that residential outdoor use ranges from 30 to 60% (p. 153) DWR Bulletin 166-4, *Urban Water Use in California*, notes that urban seasonal water use ranges from 26% to 58%. (p.24) Bulletin 166-4 notes that while some seasonal water use is not due to landscape use, this is offset by the fact that some landscape water use occurs year round. Therefore, seasonal use is a reasonable approximation for landscape use.

[16] Benefits to the Delta may be somewhat lower than that since some portion of applied landscape water may return to the system for future use.

[17] Gleick, et al., Appendix B.

[18] Hagler Bailly Services, Inc., *The CII ULFT Savings Study*, (San Francisco: 1997) Sponsored by the California Urban Water Conservation Council

showerheads, faucet aerators, and leak detection) could yield over 300,000 acre-feet.[19]

Implement existing BMPs for commercial, industrial and institutional water use at levels above MOU specifications. Additional savings are also possible from commercial, institutional, and industrial (CII) water conservation efforts above MOU specified levels. CII use represents almost 40% of urban water use, or almost 3.5 million acre feet. Recent studies estimate potential cost-effective savings of 20 to 30%,[20] which corresponds to statewide savings of 700,000 to 1 million acre feet. Full implementation of the CII BMP should capture 350,000 acre feet, leaving at least 350,000 to 650,000 of cost-effective savings available.

3. Water Acquisitions and Transfers

California already has an enormous developed water supply, much of which is currently used in a highly inefficient manner. In addition, California's rigid and inflexible system for allocating available supplies according to seniority exacerbates water management problems in the over-allocated Bay-Delta system. Thus, relatively small periodic "shortfalls" can, and do, fall disproportionately on particular users. In such a seniority-based system, where the marginal cost of developing "new" supplies is high and the marginal benefit of the least productive water uses is low, voluntary transfers between consumptive users offer potentially significant economic and water supply reliability benefits to individual water users and the state as a whole. They can also be used to address our over-allocation problem directly, and to provide a cost-effective and flexible suite of approaches for helping to secure and sustain improved ecosystem flows. Finally, transfers have the potential to provide significant near-term and dry year benefits, making them particularly appropriate for a major effort in CALFED's Stage 1.

Many other demand side strategies discussed in this section offer the potential for real water savings. However, water users will resist more stringent regulatory requirements to achieve these savings, and taxpayers are likely to resist a new generation of water development subsidies. Market-oriented transfers offer an important third path to encourage increasingly efficient use of our existing water supplies.

If transfers are conducted in an irresponsible manner, they have the potential to harm local communities and the environment, both in the Delta and in upstream regions. A variety of mechanisms can assure adequate protection for all legitimate interests and ensure that proposed transfers and acquisitions make sense as part of a more comprehensive and sustainable long-term water management framework. A full discussion of relevant assurance mechanisms is beyond the scope of this document, and will de addressed subsequently. However, measures which will be needed to facilitate the development of a more active market include:

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[19] Gleick et al., p.35.

[20] Gleick et al. p. 32, citing J. Sweeten and B. Chaput, (1997), "Identifying the Conservation Opportunities in the Commercial, Industrial, and Institutional Sector"; U.S. EPA, (1997) "Study of Potential Water Efficiency Improvements in Commercial Businesses".

- Comprehensive metering and/or equivalent measurement of "flows" of surface and groundwater into and out of the Bay-Delta system;

- A robust and comprehensive regulatory/operational surface water baseline sufficient to protect all affected public trust resources;

- A comprehensive set of basin-specific sustained yield groundwater management programs which fully protect groundwater and related aquatic and terrestrial ecosystems;

- A system for converting the above baseline and any permanently acquired ecosystem supplies into a system of permanent ecosystem rights, and for securing and tracking acquired "temporary" supplies;

- Secure and sufficient ecosystem funding;

- A proactive water transfers clearinghouse, including use of a statewide electronic bulletin board and other mechanisms;

- Strategies to facilitate meaningful community involvement;

- Water use and transfer mitigation surcharges to fund mitigation and retraining programs for members of affected local economies; and

- The adoption of measures to resolve disputes between water users, retailers and wholesalers (such as direct buy-back programs, thresholds for out-of-area transfers, or other means).

With these protections in place, an expanded market between consumptive users would allow "water short" agricultural and urban areas to purchase water from "water rich" agricultural areas, encouraging overall water use efficiency. Such a market could also induce source regions to more effectively and sustainably manage their groundwater basins for multiple benefits. But perhaps the greatest incentive to further development of a consumptive-use water transfer market would be the elimination of all subsidies for any "new" water development.

A primary objective of a more flexible, market-oriented approach to allocating available supplies should be to "re-acquire" developed water supplies to improve ecosystem protections. A voluntary, willing-seller environmental "re-acquisition" program would augment existing regulatory requirements (CVPIA, ESA and 1995 WQCP). It would also help match long-term restoration needs with variable geographic, biological and hydrological conditions by securing water rights and supplies to improve instream flows and Delta outflows.

Transfers and acquisitions should be implemented in ways which assure that there is no net increase in baseline diversions or consumption. In addition, CALFED's Stage 1 efforts should focus on facilitating increased "south-to-south" water transfer opportunities for consumptive use (including Colorado River region transfers) as well as Valley-wide ecosystem acquisitions. Subject to the above conditions, water transfers originating in upstream (above export) areas would be allowed, but limitations on through-Delta conveyance, necessary carriage water premiums, and the lesser amounts of developed water potentially available for transfer from above-export sources combine to suggest that "north to Golden Gate" acquisitions are a more cost-effective and likely result.

The primary mechanisms for acquiring environmental supplies and developing an active consumptive use water market include:

Direct acquisition of instream water rights: Water rights would be purchased from willing sellers and permanently transferred to environmental uses.

Re-operation of stored water: The purchase of stored water in existing hydropower reservoirs could be used to improve fishery flows and for riparian restoration and other ecosystem improvements.. Such purchases of stored water are not appropriate for consumptive uses, except as discussed below in Section III C 2(b) of this document.

Conservation-related investments: The water conserved through investments in improved conveyance efficiency, water saving irrigation technology, crop-mix changes, and other conservation-related investments should be shared between instream acquisitions and consumptive uses.

Voluntary land fallowing and land retirement: A huge water market could be created by transferring the consumptively used portion of water applied to some irrigated lands to the environment and other consumptive users. A mixture of drought options, short- and long-term leases, rotational fallowing, opportunistic ("spot") acquisitions, and permanent retirement, could result in millions of acre-feet of water savings per year in the Central Valley alone, as discussed above.

Groundwater transfers to instream/ecosystem use: Reducing surface water diversions during critical periods by relying on sustainable groundwater supplies could produce significant amounts of water for instream/ecosystem use.

Groundwater transfers to consumptive use: These transfers could become a significant source of consumptive use transfers over time, but should be strictly limited to previously banked groundwater supplies until shown to comply with a fully-protective, sustained-yield groundwater management plan.

The amount of water potentially available through the use of acquisitions and transfers is

discussed elsewhere in this section (e.g. groundwater, voluntary fallowing and land retirement, and agricultural conservation).

4. Wastewater Reclamation and Recycling

By the year 2020, according to CALFED, over 3 million acre-feet of wastewater will be generated annually by urban coastal areas. CALFED estimates that under a "no action" scenario California will recycle approximately half of this and generate 1.17 million acre-feet of reusable water[21]. Implementation of the CALFED water recycling program could generate from zero up to an additional 550,000 acre-feet in new supply, for total of up to 1,720,000 acre-feet in recycled supply.

Recycled water may be among the more expensive soft path alternatives. However, it offers important secondary benefits, including water quality benefits, and deferred or avoided costs for new or expanded wastewater treatment plants. Water reclamation is also one of the least controversial supply reliability measures.

While CALFED has identified the potential for creating up to 1.7 million acre feet of recycled water, it has not adopted that figure as an objective. Indeed, CALFED recognizes that the amount of new recycled water to be generated as a result of the CALFED program may only be zero.

C. Supply-Related Strategies

The strategies discussed in this section address the supply side of the water management equation. The environmental community has expressed grave concern about some of these measures because of the potential for additional serious impacts on an already devastated ecosystem. However, as part of a balanced CALFED water supply reliability program which also assures environmental water supply reliability (see Section III below), we believe that the measures identified below may have merit.

1. Groundwater Banking and Conjunctive Use

It is broadly recognized by CALFED, and among most stakeholders, that making better use of California's substantial groundwater resources offers potentially significant and cost-effective near- and long-term water supply reliability benefits for all.

Crafting and implementing an ambitious array of well-regulated groundwater storage and conjunctive management programs designed to achieve this potential should be the "supply side" focus and priority of an integrated and cost-effective Stage 1 water supply

[21] Reclamation is the exception to the "no new water" rule discussed in the introduction, as it actually does create "new" water. CALFED defines "new" water generated by reclamation as that which would otherwise be lost to consumptive use. Currently, some "unreclaimed" waste water is returned to streams and reused by downstream users. (CALFED EIR/EIS Water Use Efficiency Water Use Efficiency Component p. 1.4)

reliability strategy. As discussed further in section III B 3, necessary protections and assurances will include comprehensive groundwater monitoring as well as basin-specific sustained-yield management. Developing the institutional and legal arrangements needed to protect recharged groundwater supplies for later withdrawal is a necessary condition to successful groundwater development that would also greatly increase the incentives for implementing such programs.

The potential for groundwater banking varies according to many factors, including (1) aquifer storage capacities, (2) the relationship between groundwater levels and ecosystem needs, (3) the use of groundwater pumping to support local economic activities, (4) the source of water to be banked, and (5) the ability to convey water both to and from a particular recharge site.

Such programs will require the development of local conveyance systems, active recharge sites, extraction wells, and other local infrastructure. Nevertheless, they can be implemented in ways that provide enhanced reliability benefits for all sectors without adding pressure to an already-oversubscribed Bay-Delta system if (1) they are based on a truly comprehensive management regime, and (2) are structured to look beyond so-called "surplus" water – water which may be available for diversion or export after an improved ecosystem baseline is firmly in place – to include a diversity of alternative sources (transferred and acquired supplies, "self-savings" derived from baseline allocations, drawdowns of existing reservoir supplies, etc.).

A reservoir drawdown program illustrates the potential. In many years, a portion of the water scheduled to be carried over in existing surface reservoirs could be released and stored in aquifers through percolation or injection, or supplied directly to users otherwise dependent on groundwater (so called "in lieu" recharge). During the ensuing rainy season, these reservoirs would be able to capture additional surface runoff, thereby replacing the water previously released for storage in a groundwater bank. (In the event that "refill" did not occur, previously banked supplies and/or previously-agreed upon risk-compensation payments could be used to help to make ends meet.) While this approach is not without potential complications, studies indicate that it could result in as much as 1 million acre-feet of additional "yield" becoming available, even after factoring in the need to meet instream flow, temperature criteria, and other environmental and water management constraints.[22]

Other studies demonstrate that these and related programs are both cost effective and dramatic in their potential to address California's water management needs. For example, the CVPIA Least Cost Yield Plan estimates that active groundwater recharge programs could produce approximately 940,000 acre feet of yield per year, with costs ranging from as little as $60-$120 per acre foot. While these costs can be expected to increase as "market-based" or "self saving" source-water elements are included, they continue to show great promise in comparison other supply-oriented alternatives.

[22] NHI, 1998. An Environmentally Optimal Solution: A Response to the CALFED Bay Delta Program.

2. Changing the Operation of Existing Reservoirs.

Throughout California, more than 4,000 existing dams and reservoirs involving more than 60 million acre feet of combined storage capacity are operated according to rules and criteria that have developed in piecemeal fashion over the course of many decades. As the preceding section suggests, relatively modest changes in operations that are coordinated and integrated with other CALFED options can do much to improve water supply reliability for all beneficial uses. Before rushing to build costly new dams and reservoirs, a comprehensive re-assessment of integrated re-operation opportunities is needed in at least the following areas:

(a) Floodway Restoration and Changes in Flood Reservation: Operators of most major Central Valley reservoirs currently set aside reservoir capacity to capture flood flows in order to protect downstream property and lives. This flood reservation, in effect, reduces potential annual carryover storage of water supplies by requiring that a certain amount of reservoir space be kept empty.

Total downstream flood protection is the sum of vacated storage behind the dam and the amount of water than can be released in any given period of high runoff. Annual carryover storage -- and thus water supply reliability -- could be significantly increased if dam operators were allowed, in appropriate circumstances, to decrease the total flood reservation space behind the dam. There are three basic, and often necessarily integrated, approaches to responsibly increasing water storage and subsequent yield, without compromising important flood control functions:

- Develop more sophisticated reservoir rule curves that incorporate forecast-based release operations and integrated reservoir operations. Such operations would allow both conditional encroachment of existing flood control reservations as well as encourage larger temporary reservations as meteorological conditions dictate.

- Increase dam outlet capacity where outlet constraints limit effective use of downstream floodways and reservoir flood control reservations.

- Increase floodway capacity and the ability to safely inundate floodplains if floodways prove insufficient to handle foreseeable flood flows.

In this context, floodway and floodplain capacity restoration would include: wider floodways; purchase of land or easements on lands that would flood by design; increased protection where needed, such as localized ring levees, for sensitive infrastructure or communities; and other options for getting, and/or keeping, people "out of harm's way."

Increasing the frequency and size of moderate flood events, concurrently with other actions to restore floodways is already a central part of the CALFED ecosystem

restoration program. In addition to facilitating the attainment of ecosystem objectives, this approach would provide the added water supply reliability benefit of augmenting storage in existing reservoirs. It is important to note that this approach would not affect the size or frequency of large floods, as it would not reduce the total flood reservation.

CALFED should evaluate the potential for increasing annual carryover storage by increasing allowable controlled releases from Central Valley dams as floodways are restored, thereby reducing the amount of reservation necessary behind each dam. For example, analysis of operations at Friant Dam indicate that alterations in the flood reservation regime could increase carryover storage on the San Joaquin River by approximately 5 to 10 percent.[23] Assuming that altering the flood reservation regime at other major terminal reservoirs could increase storage by 2-3 percent, this measure could increase annual storage in the Central Valley by a minimum of 400,000 to 600,000 acre feet. The actual increase in the amount of water captured and stored from this operational change can only be estimated through additional site-specific modeling analyses. However, a comparable small percentage increase in available carryover storage at most major reservoirs has the potential to significantly improve water supply reliability Valley-wide, particularly in dry years following wet years.

(b) Reoperating Hydropower Reservoirs: The non-consumptive water storage rights in existing hydropower reservoirs (up to 3.2 million acre-feet of combined capacity) can potentially be purchased and utilized for a variety of reliability purposes. For example, a portion of the flood-reservation burden discussed above could be transferred to acquired hydropower storage capacity. Upstream hydro-storage capacity could also be used to re-regulate acquired instream supplies, including acquired storage rights, ensuring that purchased flow improvements are available when and where needed. The purchase and transfer of non-consumptive storage rights to consumptive purposes may be appropriate for upstream (area of origin) communities if implemented in conjunction with environmentally restorative actions and if offset by equivalent reductions in exports of "surplus" water (i.e., water surplus to the needs of area of origin communities and ecosystem resources.) Given the scope and direction of the electric utility industry restructuring currently underway, a comprehensive evaluation of all such opportunities should be a critical focus of CALFED's Stage 1 efforts.

(c) Environmental Water Banking. It has been a long-standing practice in the federal CVP to "reschedule" allocated water from one year to the next. Such informal "banking" of unused allocations has never been available to ecosystem resources, even though it was affirmatively authorized "for drought protection and other purposes" in conjunction with the dedication of ecosystem supplies under the 1992 CVPIA (section 3408(d)). One need look no farther than across the Sierra Nevada crest to see how the Truckee River Operating Agreement is using reservoir banking and a market-based acquisition program to facilitate improvements for all involved. Developing and implementing similar programs throughout the Central Valley should be another focus of CALFED's Stage 1

[23] NHI, 1998. An Environmentally Optimal Alternative: A Response to the CALFED Bay Delta Program.

efforts.

3. Restore Upper Watersheds

Watershed restoration to increase water infiltration and retention will increase surface and groundwater yields in dry seasons and years, particularly in undammed watersheds. Watershed restoration would provide the added benefits of improving ecosystem conditions and attenuating flood peaks. Loss of existing reservoir storage capacity from sedimentation due to erosion in the upper watersheds could also be stemmed through commitment to a significant and well-funded watershed restoration program. Although measurable water supply benefits from watershed restoration will take several years to accrue, they could prove to be particularly valuable in the event of prolonged drought or a shift in the rain to snow ratio resulting from predicted global warming. At this time, there is not enough information or analysis to calculate the magnitude of increased yields from watershed restoration, but the promise of this approach warrants more examination of this approach.

4. Changes in Delta Operations

We recognize that certain changes in Delta operations and construction of certain facilities could provide increased supplies for consumptive uses of water. However, such reoperations and facilities could also exacerbate ecosystem harm. We support the approach that is now being developed by the DEFT and "No Name" groups to integrate fully planning for water supply flexibility tools with increased environmental protections in the Delta. There appears to be reason for optimism that water supply reliability for consumptive uses can be increased while promoting ecosystem health.

CALFED's proposal to explore modifications that would provide greater operational flexibility including use of joint point of diversion, relaxation of COE criteria to allow increased SWP pumping capacity and construction of an intertie between the California Aqueduct and the Delta-Mendota Canal should be evaluated only within the framework of new criteria for biological protection. Otherwise, the use of these tools and facilities could potentially undermine CALFED's ecosystem restoration objectives and off-set biological benefits to fish species of concern (i.e., chinook salmon, steelhead trout, Delta smelt, and striped bass, and others). Assessment of these tools should not be limited to effects within the Delta, but should also include the expected effects of changes in reservoir operation on instream flows and riparian corridors.

In our view, implementation of the operational flexibility measures under consideration by CALFED should be bound by the following express conditions:

(a) All baseline regulatory requirements (the 1995 WQCP, the CVPIA and current ESA protections) are implemented in full;

(b) All additional biological protections proposed for Stage 1 by EWC (see below) and

required for future compliance with state and federal environmental laws be implemented in full; and

(c) Assurances are in place guaranteeing that operational changes will conform with the criteria listed in 1 and 2 above and will enable the public to enforce these conditions.[24]

D. Flow-Related Ecosystem Needs

As discussed in Section 1, CALFED's water supply reliability program must do more than provide reliability for consumptive use -- it must also provide reliability for the environment. This reaches beyond mitigation for adverse impacts related to consumptive use of water and to the affirmative requirements of the ecosystem restoration program.

Restoring the Bay-Delta ecosystem, both upstream and in the Delta, will require water, as clearly indicated by the ERPP and DEFT discussions. That water must be provided by CALFED through its water supply reliability and other program elements. We believe the evidence demonstrates that CALFED can craft a program which provides significant water supply reliability benefits for both ecosystem restoration and urban and agricultural water users. Given the level of impacts from existing diversions, the long-term ecosystem needs are substantial. While it develops specific measures to meet these long-term needs, CALFED should begin by meeting the most urgent ecosystem needs during Stage 1 by implementing the actions outlined below.

1. Delta Flow-Related Improvements: Improvements in Delta operations are currently under discussion in the DEFT group. While these discussions continue to progress, our initial recommendation is that CALFED should implement the following biological protections in the Delta. These criteria represent ecosystem protection measures above and beyond the current level of protection provided by the 1995 WQCP, full implementation of the CVPIA and current ESA protections. Additional restrictions on exports during periods of significant biological concern are necessary given the status of many estuarine dependent species that are either listed or proposed for listing under the state or federal ESA's.

- April and May: Operations should be adjusted to provide increased Delta inflow from the San Joaquin River, and decreased exports, as specified in the VAMP study, during the entire months of April and May to provide increased protection of outmigrating San Joaquin chinook salmon and Delta smelt.

- November through January: Operations should be adjusted during the fall months to achieve a reduced export/inflow ratio (55% in November and 45% in December and

[24] For example, it may be necessary to establish a mechanism to bank a pre-determined amount of water (a portion of the yield of water supply tools such as joint point, groundwater storage, transfers and land retirement) to be called upon as necessary to reduce Delta exports and allow resource agencies to directly respond to biological problems at the export facilities.

January) to provide increased protection for spring run yearlings, and fall- and late-fall run fry emigrating through the Delta.

- February and March: Operations should be adjusted to provide increased Delta outflow in February and March, in dry years, to achieve X2 protection consistent with a 1962 level of development. This would provide an increase in protection for most estuarine and anadromous fish, particularly Delta smelt.

Potential impacts to Suisun Marsh from changes in Delta flow patterns have not been adequately evaluated or addressed. CALFED should develop and implement additional measures to protect and restore the biological diversity of Suisun Marsh.

2. Upstream Flow-Related Benefits: The ERPP, the AFRP and endangered species recovery plans all call for improved flow conditions in upstream areas, north and south of the Delta.. CALFED should continue to develop and implement these flow improvements during Stage 1, to provide improved habitat for species of concern and to achieve other CALFED ecosystem restoration goals.

3. Cap on Depletions and Diversions: We have elsewhere discussed the need for a state water budget. Establishing and implementing such a budget will require an adequate baseline, accurate measurement, a clear accounting methodology and, in our view, a cap on average annual diversions and depletions from the Bay-Delta system. Such a cap would offset capability to divert large amounts of water in wet years, with badly needed protections in dry years. This cap should be no higher than and, by the end of stage 1, should be lower than current levels.

SECTION IV: REVISED STAGE 1 ACTIONS FOR WATER SUPPLY RELIABILITY

Below are a limited set of preliminary recommendations intended to respond to the proposed Stage 1 recommendations in the August version of the draft "Developing a Preferred Alternative" document. As indicated below, some of these actions should be completed prior to Stage 1.

A. A Foundation for Water Supply Reliability

1. Prior to Stage I, CALFED should establish measurable objectives for each element of the water supply reliability program, including water conservation, recycling, and transfers.

2. Develop a water budget for the Bay-Delta system, including establishment of a registry of instream flows and more comprehensive measurement of withdrawals, depletions, diversions and exports for consumptive use.

3. Prior to Stage 1, develop realistic and accurate modeling assumptions regarding baseline water deliveries in the CALFED no action alternative.

4. Implement a surcharge on water use in the Bay-Delta system to fund the ecosystem restoration program.

5. Create a finance strategy to incorporate the full environmental and economic costs of water supply reliability strategies.

B. Demand Benefits

1. Measure all agricultural and urban water use.

2. Implement certification and enforcement program to ensure full implementation of the urban water conservation BMP's.

3. Capture conservation savings above full implementation of the Urban MOU. This should include implementation of the BMP's at a level that would capture all cost-effective savings, as well as implementation of cost-effective measures not yet included in the MOU.

4. Prior to Stage 1, develop performance standards for agricultural water use efficiency to measure progress towards program objectives, and an enforcement program comparable to the one proposed for urban water use.

5. Develop loan, grant and cost-sharing programs to increase local participation in urban and agricultural water conservation strategies.

6. Design and implement research programs/pilot programs to address remaining areas of uncertainty in water use efficiency. For example, conduct research on the relationship between evaporation and transpiration, and the potential for reducing irrecoverable losses through reductions in evaporation.

7. Prior to Stage 1, complete CALFED's economic marginal cost analysis of water management alternatives. Ensure that secondary benefits of "soft path" alternatives, including water quality, flood management, avoided drinking water and waste water treatment and capital costs, energy savings, etc. are fully reflected in this analysis.

8. Identify and then develop a program and plan to address legal and institutional barriers to water transfers, and improve use of existing infrastructure for transfers, as appropriate.

9. Develop and implement an appropriate set of assurances to provide protection to the environment and local economies from water transfers.

10. Encourage "south to south" transfers to meet consumptive use needs and "north-to-Golden Gate" and storage transfers to meet environmental needs.

11. Establish, fund and implement an environmental water acquisition program with at least an annual budget of $100 million to endow a drought year reserve fund and help meet long-term ecosystem restoration objectives. Performance measures to indicate successful implementation, in amounts of water, or the like, should be established prior to the initiation of Phase I and linked to other program elements.

12. Develop proposals for an institutionalized groundwater bank to facilitate transfers (see related recommendations below).

13. Develop best management practices for water recycling, including full evaluation of recycling opportunities, regional water recycling targets, and performance standards.

14. Develop loan, grant and cost-sharing programs to increase local participation in recycling strategies. Such programs should encourage regional efforts.

C. Supply Benefits

1. Develop an implementation framework for a comprehensive and properly regulated groundwater banking and conjunctive use program, including measurement of groundwater; designation of sustainable yield (maximum allowable while preserving aquifer capacity, ecological benefits and other values) for each groundwater basin; feasibility and cost studies; pilot projects; criteria for evaluation, permitting and operation of specific projects; statutory changes to address barriers to implementation; and construction of recharge, pumping and conveyance infrastructure. CALFED

should also develop loan, grant and cost-sharing programs to increase local participation in groundwater strategies.

2. Investigate and implement reservoir reoperation to utilize expanded floodways for all major reservoirs in the Central Valley.

3. Investigate and, as appropriate, implement the Delta reoperation strategies identified in Section III C, subject to the express environmental conditions set forth in Section III C and D. Develop appropriate assurance mechanisms.

4. Complete least cost and equivalency analyses, and develop willingness to pay formulas for potential new or expanded surface storage facilities. Require water users to pay the full planning costs for any such studies.

D. Flow Related Ecosystem Benefits

1. Implement the Delta flow improvement measures discussed in Section III D.

2. Develop and implement flow-related improvements for Suisun Marsh, upstream, riparian and floodplain restoration.

3. Develop and implement an environmental water banking program in groundwater and existing surface storage facilities, as authorized by the CVPIA.

4. Establish a cap on average annual withdrawals, depletions and diversions from the Bay Delta system which is no higher than current levels.

APPENDIX 1: PRELIMINARY MODELING RESULTS OF POTENTIAL CHANGES IN DELTA OPERATIONS

This appendix compares preliminary modeling projections of both export availability and ecosystem protection under our recommended Delta operating criteria to other management scenarios. These scenarios include:

1. Actual operations since 1975 (using information from the Dayflow database).

2. Projected operations complying with ESA requirements, the 1995 Water Quality Control Plan, and Interior's interim criteria for implementation of the CVPIA (DWR's DWRSIM study 549new).

3. Projected operations complying with the protective criteria described in Section 3 in addition to those described under (2) above (EWC DWRSIM study EBSSN-5).

4. Projected operations complying with the protective criteria described in Section 3 and including use of the joint point of diversion, the Interim South Delta Plan, and an intertie between the Delta Mendota and California aqueducts (EWC DWRSIM study EBSSN-6).

Table A1-1 compares total Delta exports under these scenarios for three periods, (1) the recent dry period from June 1986 until September 1992, (2) recent water years 1975-1994, and (3) the historic hydrology from 1922 until 1994. For the exports projected under studies EBSSN-5 and EBSSN-6, no assumption is made as to how this water is distributed after leaving the Delta for any of its possible uses, including delivery to export project urban and agricultural contractors, wildlife refuges or water bank to be used for environmental purposes. Figure A1-1 summarizes average Delta exports by month under each of the modeling studies.

Table A1-1 shows that, under the water management criteria recommended by EWC for implementation by CALFED in stage 1, average annual Delta exports are projected to be 395,000 acre-feet higher than those which actually took place under the recent historical hydrologic conditions from 1975 to 1994. It is not possible to compare actual to projected exports for the entire historic hydrology, since the Delta exports projects were not developed until the 1950s and 1960s. During a repeat of the very dry conditions between 1986 and 1992, which led to the most recent sharp decline in fisheries, however, average Delta exports under the EWC criteria are projected to be 774,000 acre-feet less than what actually occurred.

Preliminary modeling results suggest that the additional flows in the San Joaquin River can be achieved by allowing water to flow through tributary reservoirs during the April-May period. The average total flow increase of 52 TAF in April and May is offset, through reservoir reoperation, by a flow reduction of 49 TAF in other months. As a result of this reoperation, very little, if any, reduction in consumptive use would be required.

Figure A1-2 shows the projected average Delta inflow from the San Joaquin River during the April-May outmigration period for fall run salmon under each of the studies outlined above and compares these values to unimpaired flow estimates. Figure A1-3 shows the projected end-of-year storages for San Joaquin tributary reservoirs under each scenario. It is assumed that no releases from Friant Dam are made for fishery objectives.

Figure A1-4 shows how total exports would change under each of the modeling scenarios in December. In study EBSSN-5, exports would be curtailed in many years to protect winter-run and spring-run salmon. Study EBSSN-6 would also restrict December exports to protect these species, but would allow higher rates of export under wet conditions. Figure A1-5 shows the export inflow ratio for each of these scenarios in December.

Figures A1-6 and A1-7 show the projections under each scenario for total exports and the export-inflow ration in September, where scenarios EBSSN-5 and EBSSN-6 would allow a higher export-inflow ratio.

Figures A1-8 and A1-9 show the spring X2 position, in Critical and Dry years respectively, under each of the scenarios. The improvements in February and March in Dry and Critical years are due to the specific criteria recommended above. The improvements in April and May are due to the incremental protection provided by the extended export restriction during the April-May pulse period.

Table A1-1
Delta Export Comparison
(all values in TAF)

	Actual Historic Delta Exports	Study 549new		Study EBSSN-5		Study EBSSN-6	
Period	Average Exports	Average Exports	Difference from Actual	Average Exports	Difference from Actual	Average Exports	Difference from Actual
June 1986 - September 1992	4979	4328	651	4205	774	4342	636
October 1975 - September 1994	4596	5297	-700	4992	-395	5123	-527
October 1921 - September 1994	NA	5774	----	5402	----	5524	----

Figure A1-1
Delta Export Comparison
average of all years (1922-1994)

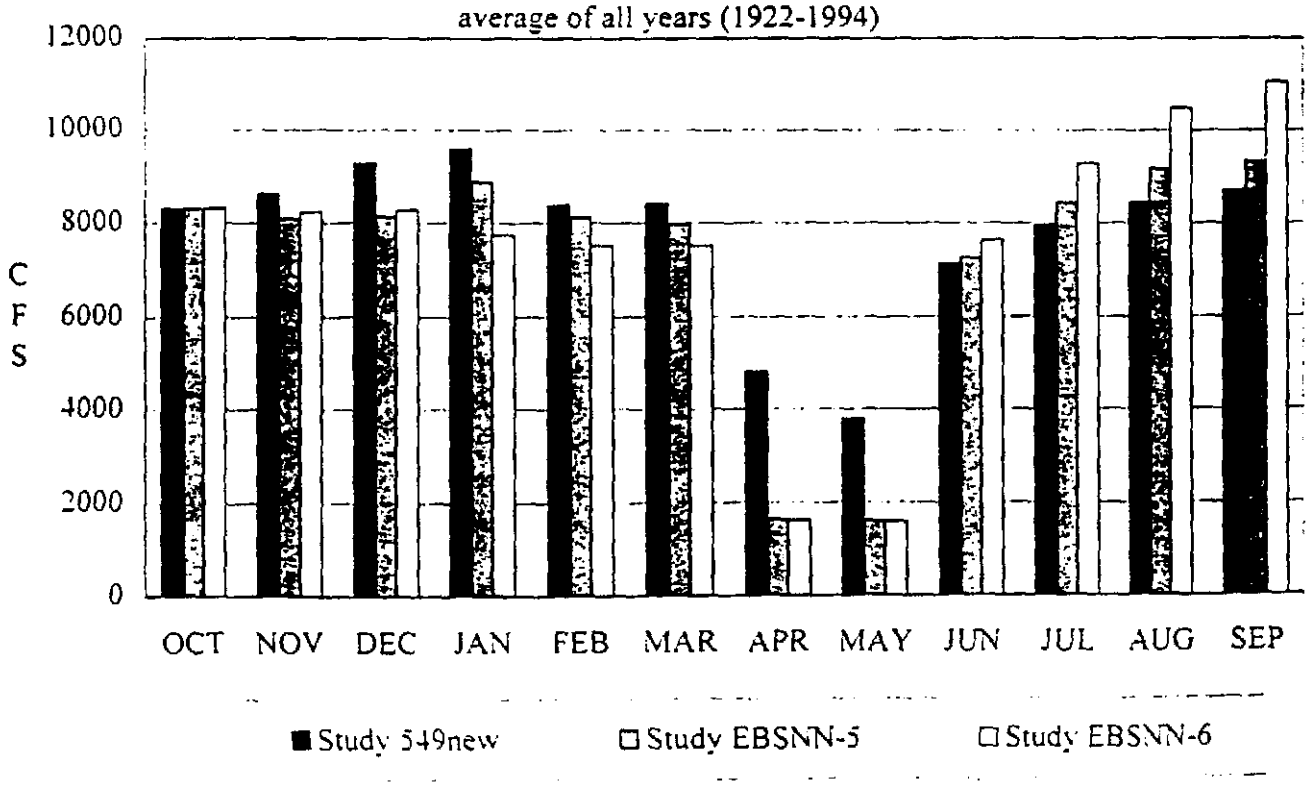


Figure A1-2
San Joaquin River at Vernalis
April-May Average Flow by Year Type

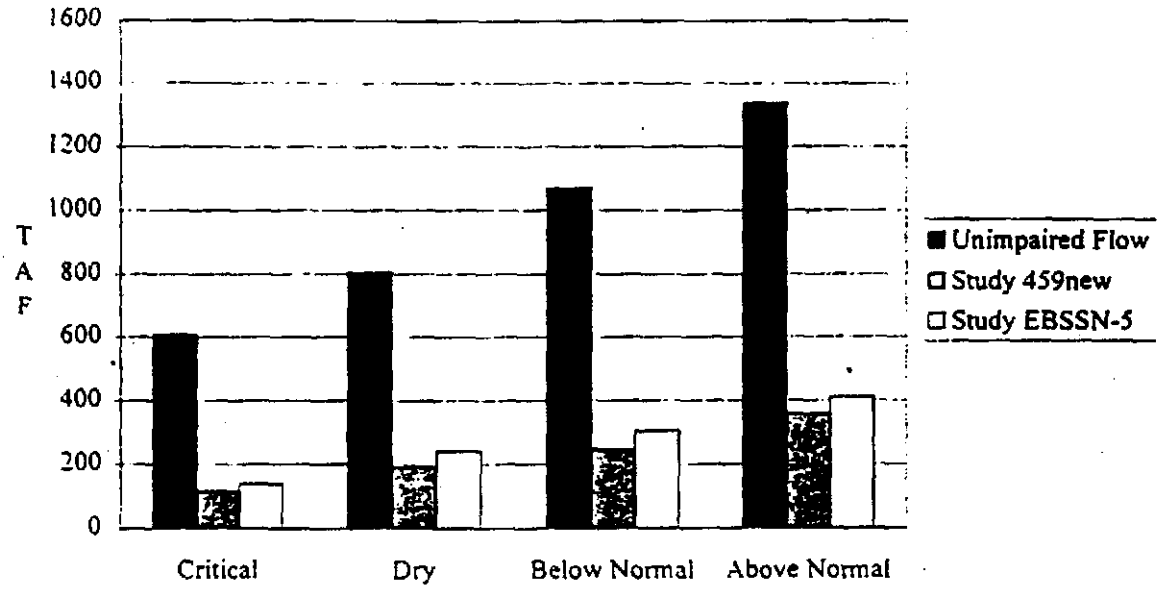


Figure A1-3
San Joaquin Tributary Reservoirs
Projected Carryover Storage

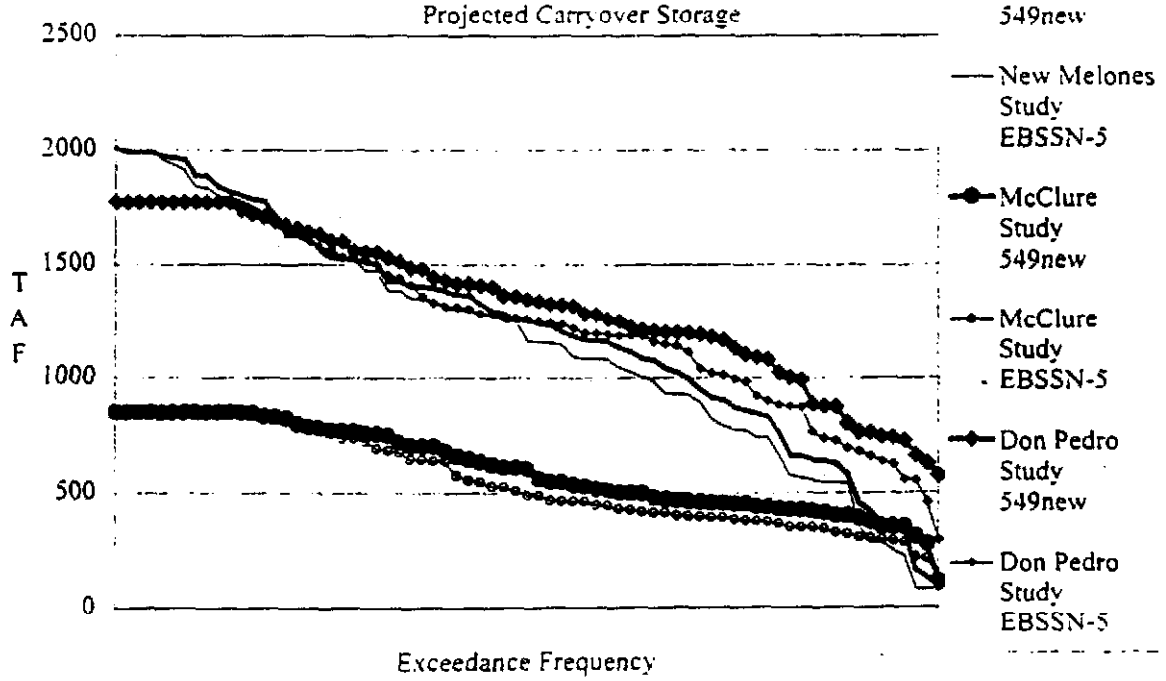


Figure A1-4
December Delta Exports

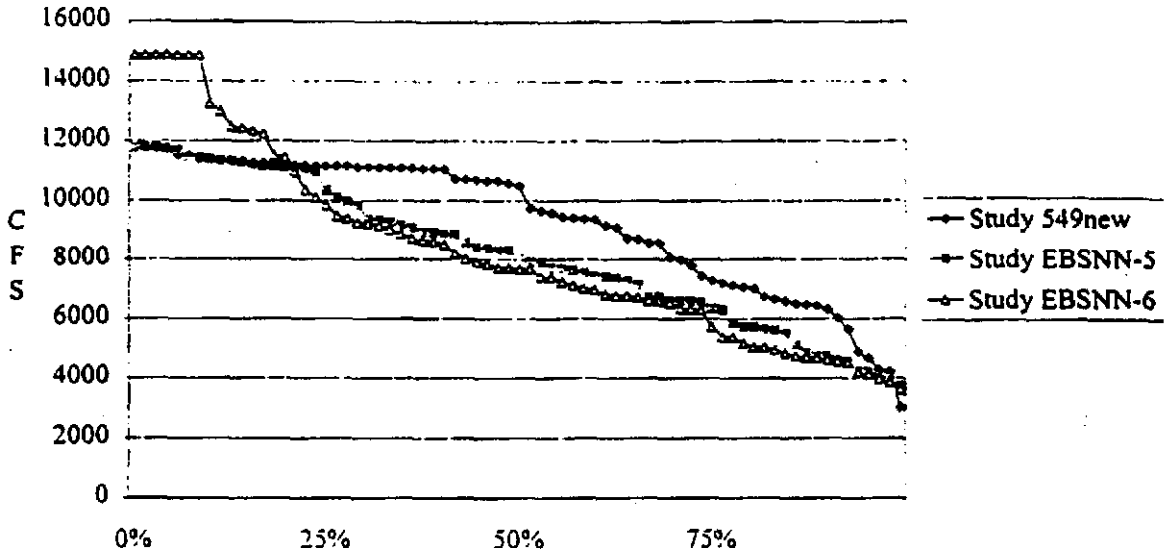


Figure A1-5
December Export-Inflow Ratio

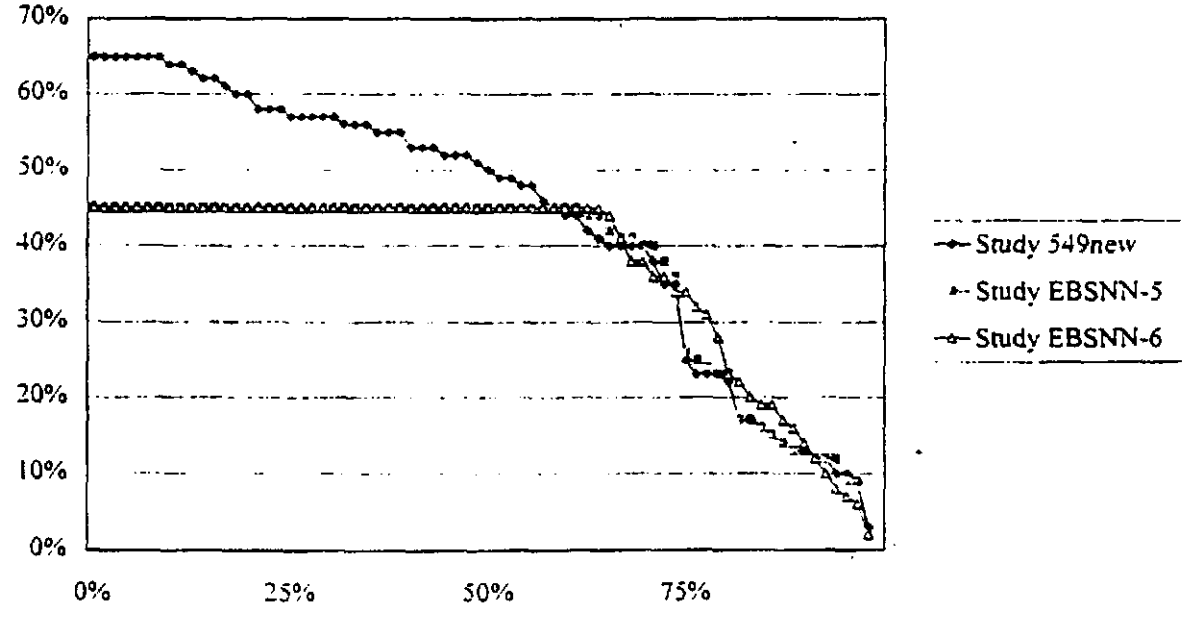


Figure A1-6
September Delta Exports

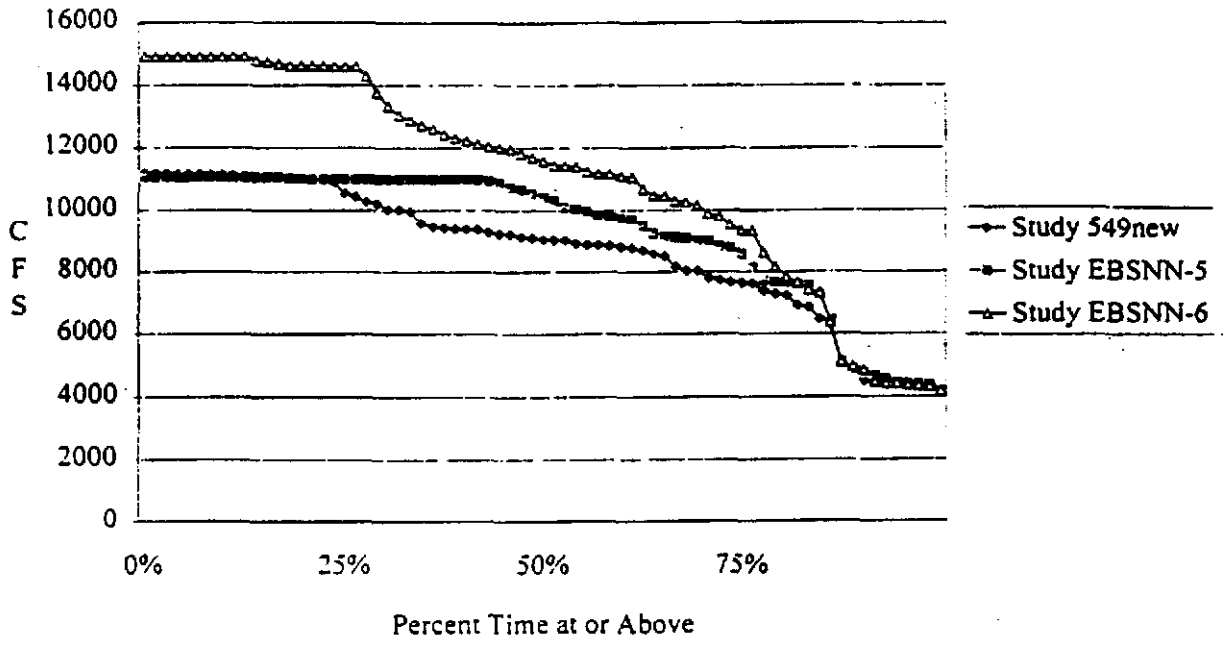


Figure A1-7
September Export-Inflow Ratio

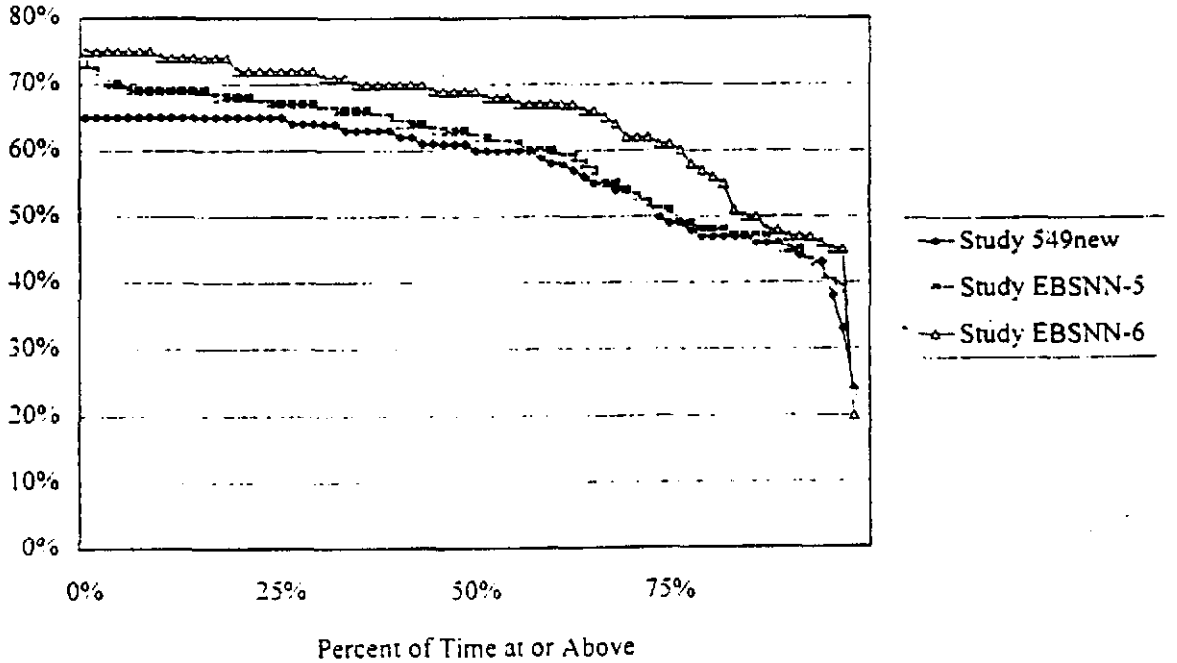


Figure A1-8
Critical Year Average X2 Position

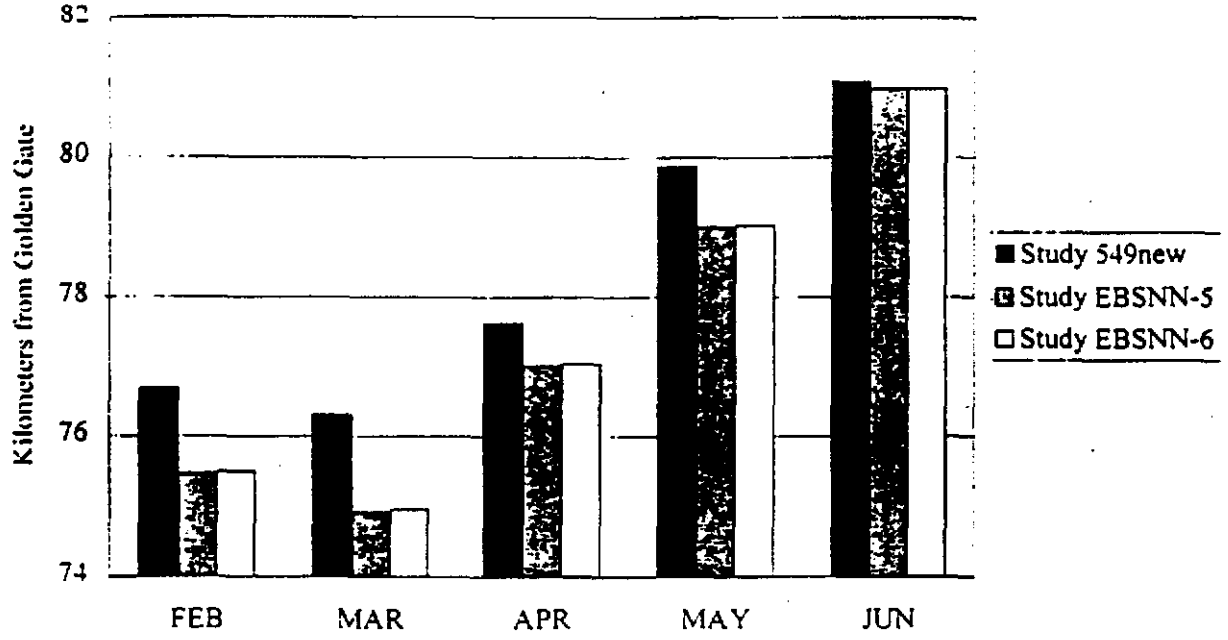
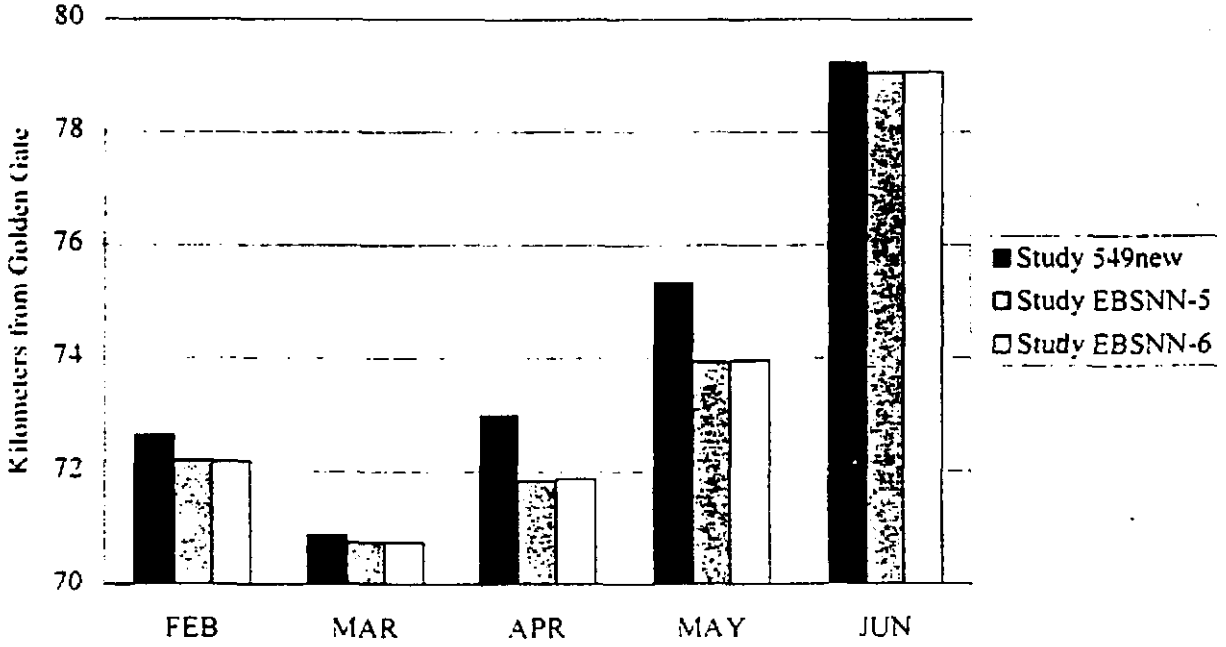


Figure A1-9
Dry Year Average X2 Position



ATTACHMENT FIVE

Save San Francisco Bay Association
Environmental Defense Fund
Natural Resources Defense Council
The Bay Institute of San Francisco

March 24, 1999

Lester Snow
CALFED Bay-Delta Program
1416 Ninth Street, 11th Floor
Sacramento, CA 95814

Dear Lester,

We write to provide our comments on the February, 1999 draft Integrated Storage Investigation (ISI) white paper. We support an integrated approach, both to the evaluation of storage and to the evaluation of an overall water management strategy. We are encouraged that the ISI represents a first step towards addressing critical issues which we have raised for some time. However, as drafted the ISI does not provide a truly integrated and comprehensive approach to resolving storage-related issues in the CALFED process, primarily because it fails to ask the critical questions.

Because the next key decision point for CALFED is the release of a draft preferred alternative, our comments address the extent to which the ISI outlines an analytical process which will provide the answers which CALFED and stakeholders will need to craft and evaluate a preferred alternative. We have attached detailed comments, which are summarized below:

- The evaluation of storage must take place within the context of a comprehensive and integrated Water Management Strategy, including specific water supply reliability objectives. The ISI must not simply assume that additional surface storage is necessary.

- The ISI must establish clear operational criteria and assurances for any proposed new storage facilities. Clear operational criteria are needed to indicate how CALFED intends to balance alleged benefits of new surface storage facilities, some of which may be in direct conflict with each other (e.g. increased flood reservation capacity and increased water supply).

- The economic analysis of water management options and the CALFED financing strategy must reflect the same operating assumptions utilized in the ISI. Without a specific plan for the operation of new facilities, it is not possible to evaluate cost and alternatives, or to determine beneficiaries for a financing strategy based on CALFED's "beneficiaries pay" principle.

- Developing a financing strategy must be an early priority for the ISI. Given the cost of new facilities, financing will have a profound effect on the final preferred alternative.

- CALFED must thoroughly investigate the potential impacts and alleged environmental benefits of new storage in its ecosystem restoration program, and apply these findings in the ISI.

- The ISI should reflect the fact that the reoperation of existing hydroelectric facilities will not produce "new" water.

- The ISI must distinguish between work needed to make programmatic decisions regarding new surface storage and site specific investigations which will be used to justify specific projects.

- The ISI must be carefully constructed to meet the requirements of Section 404 of the Clean Water Act and other environmental laws.

- The ISI must provide a firm foundation for a science-driven, objective evaluation of dam removal opportunities.

- The ISI must address key groundwater and conjunctive use management issues.

We are strongly supportive of the goal of developing a truly integrated and comprehensive ISI and Water Management Strategy and look forward to working with you to refine the current drafts.

Sincerely,

Barry Nelson/Cynthia Koehler
Save San Francisco Bay Association

Spreck Rosekrans
Environmental Defense Fund

Ann Notthoff
Natural Resources Defense Council

Gary Bobker
The Bay Institute of San Francisco

1. CALFED must focus on preparing an integrated Water Management Strategy.

One of CALFED's greatest successes has been the development of a Strategic Plan for Ecosystem Restoration. The Plan identifies specific restoration objectives and outlines the course of action for their attainment. For many months the conservation community has pressed CALFED, and its member agencies, to adopt a similar approach to water supply reliability. To date, CALFED has no clear water supply reliability objectives and no coherent strategy for achieving them. Rather, the approach to reliability has been, in effect, simply to maximize all "tools". Without repeating our prior criticisms of Bulletin 160's demand and shortage projections, we note that there is no consensus yet around a reasonable range of reliability objectives for CALFED.

The fundamental problem with the ISI as drafted is that it appears to begin with the conclusion that additional surface storage will be part of the CALFED preferred alternative. As you know, it is our view that CALFED has failed to make the case that new surface storage is (1) required to meet reasonable CALFED water supply reliability objectives; (2) economically competitive with other reliability options; or (3) compatible with the other CALFED program objectives, such as ecosystem restoration. We remain open-minded about each of these questions and believe that it is appropriate for CALFED to investigate them. However, we cannot countenance CALFED's failure to resolve these issues in what has become a rush to judgment that new (or expanded) reservoirs are necessary.

We believe that the three questions above are the ones that CALFED must focus on and address before proposing a preferred alternative. The issue is not "where and how" but "whether and when". In its current form, the ISI fails to address and resolve these foundational questions and prematurely moves towards an emphasis on site specific planning investigations. Such investigations are simply not appropriate unless and until a thorough programmatic level review makes a compelling case for the role of new surface storage in the water supply reliability mix.

2. The ISI must establish operational criteria and assurances for any proposed new storage facilities.

Proponents of new storage facilities have often claimed potential benefits for flood control, water quality, drought water supplies and ecosystem restoration. We remain skeptical of the feasibility of developing new storage which could actually provide such broad benefits. In fact, some of these alleged benefits may be in direct conflict (e.g. increases in flood reservation capacity would reduce water supply yield). However, these "benefits" are being cited as justification of new facilities. In addition, agricultural interests

continue to press CALFED to develop new facilities primarily to increase average annual deliveries to water users, primarily agricultural contractors.

For CALFED to determine the need (if any) for additional storage, the ISI must produce clear operational criteria for any proposed storage. In addition, before any new storage is determined to be needed, the ISI must provide adequate assurances that such facilities would be operated in compliance with the operational criteria which have been used to justify its construction.

Recent conversations with CALFED staff have illustrated the importance of this challenge. We understand that initial modeling of new surface storage reveals that operational criteria focused on providing drought year benefits would produce relatively small dry year increases in yield, significant decreases in average year yield and a significant increase in unit costs. As a result, CALFED's modeling efforts appear to be focused on operating new storage for average year supplies. If actually constructed and operated in this manner, it is entirely possible that such new facilities would fail to provide significant water supply benefits in an extended drought (even without considering the environmental and economic costs, as well as flood management and water quality issues).

We believe that these results, although preliminary, suggest that new surface storage may not be an appropriate part of a CALFED preferred alternative. However, the current approach appears to be to change the focus of CALFED's water supply reliability program from dry year benefits to increasing average deliveries, for the specific purpose of keeping surface storage "in the mix".

CALFED must take great care to assure that the investigation of storage and other tools remains focused, transparent and credible. Without clear water supply reliability objectives and a well-designed investigative program, a preferred alternative will be largely determined by intuition and political considerations. Under such circumstances, CALFED is unlikely to be successful.

3. The economic analysis of water management options and the CALFED financing strategy must reflect the same operational assumptions utilized in the ISI.

The CALFED economic analysis must be based on the same operational assumptions utilized in the ISI. The cost of new storage, for example, depends a great deal on the operational assumptions regarding the availability of water to fill new storage and how, when, and to whom this water is delivered. At the moment, there does not appear to be full coordination among the operational and economic evaluations.

For example, some water users have suggested that new surface storage facilities could be operated in conjunction with new groundwater storage facilities. Under this scenario, new reservoirs would capture peak flows and then "meter" this water out into new groundwater reservoirs. The cost of an acre foot of water which relies on this "dual storage" scenario would be very high. The Economic Evaluation of Water Management Alternatives has not, we believe, begun evaluating the cost of such an alternative.

Likewise, developing a financing strategy based on CALFED's "beneficiaries pay" principle will require determining the beneficiaries of new storage based on clear operational assumptions. As discussed above, we believe that alleged water quality, ecosystem and flood control "benefits" are being used to blur the process of defining beneficiaries of new storage. We are pleased that the ISI continues to contain the CALFED "beneficiaries pay" principle, however, without clear operational assumptions, a definition of beneficiaries and a process for obtaining early "buy in" to a CALFED financing package, such a principle is virtually meaningless.

4. Developing a financing strategy must be an early priority for the ISI.

As discussed above, the ISI and the Water Management Strategy have not yet developed a financing strategy. Given the multi-billion dollar cost of a preferred alternative, financing is likely to be one of the major factors determining the content of the preferred alternative. Therefore, it is critical that CALFED develop a financing strategy in the very near future, along with commitments to pay from potential beneficiaries (and therefore funding partners). This package must be developed well before a preferred alternative is identified, not after the fact. Without a commitment to finance from beneficiaries, no true evaluation of the need for new storage can be completed.

The financing of new storage investigations should include up-front cost sharing by water users and full reimbursement should any project be constructed. In the case of Delta Wetlands, discussed in the ISI, the cost of these investigations are being borne by private interests. We fear that public financing of some storage investigations could give these alternatives an unfair and inaccurate advantage over other tools.

Finally, some stakeholders have suggested that new surface storage should be built with ecosystem funds, because these facilities will provide ecosystem benefits. These alleged benefits are discussed below, however, even in the unlikely event that CALFED is able to demonstrate ecosystem benefits from new surface storage, this finding by itself should not trigger ecosystem funding from new storage. First, CALFED must consider unmet mitigation obligations of water users. Second, CALFED must determine what ecosystem actions will provide the most "bang for the buck" from limited ecosystem

restoration funds. Once this evaluation is completed, we believe that there will be no justification for using ecosystem funds for the construction of new surface storage facilities.

5. CALFED must thoroughly investigate potential impacts and alleged environmental benefits of new storage in its Ecosystem Restoration Program, and apply these findings in the ISI.

The draft ISI paper acknowledges the importance of addressing key environmental issues. Nevertheless, it contains very limited investigation with regard to such issues beyond a modest inquiry into the development of operating criteria for filling new reservoirs. There are, of course, other potential impacts from new storage reservoirs. Evaluating some of these impacts, such as the cumulative impacts of depletions and diversion (suggesting the need for a diversion and depletion cap and a "water budget") temperature changes and geofluvial impacts will require substantial efforts. At the moment, the Ecosystem Restoration Program and the ISI do not identify how these potential impacts will be fully investigated.

CALFED's evaluation must go beyond investigating the adverse environmental impacts of new surface reservoirs. A fundamental assumption of the Program is the premise that construction of new surface water storage will in fact benefit the fish and wildlife resources of the Bay-Delta watershed and that more environmentally friendly, economically viable alternatives are not feasible. This is an issue around which there is considerable controversy and virtually no consensus. If CALFED is going to continue to include new surface storage in the preferred alternative as the environmentally superior alternative, it must produce compelling technical justification to support this premise.

We have several concerns in this regard. First, we are not aware of any situation in which new surface water supply reservoirs have been successful in providing environmental benefits over and above the adverse environmental impacts they have caused or contributed to. Second, the notion that "dams are for fish" is skewing the beneficiaries question to the point that we are seeing proposals to use limited ecosystem restoration money to implement new dam building. This is one of the most serious and troubling aspects about the current direction of the CALFED program. We are aware of virtually no justification or evidence offered by CALFED to date to support claims of environmental benefits from new storage facilities. At the moment, although there are very ambitious programmatic and site specific investigations evaluating new surface storage, we do not see, in the ISI or elsewhere, an ambitious, affirmative program to investigate claims of environmental benefits.

The frequently-cited concept that water has a "time value" for the environment is not new. In fact, storing water when its value is perceived to be lower and releasing it when its value is perceived to be higher is the reason all water supply reservoirs are built. Dry year or dry season environmental benefits have been claimed for many storage facilities. However, we have not been able to discover any comparable situation where such "time value" environmental benefits have been produced by new surface storage. In fact, the actual results are usually to the detriment of the environment. Given the enormous modification of the natural hydrograph which has already taken place in the Bay-Delta watershed, we are very skeptical of assertions of environmental benefits from new surface storage facilities.

The relationship of new storage facilities and flood plain restoration provides a clear example of the importance of coordinating storage modeling and environmental analysis. The ecosystem restoration program is developing an ambitious floodplain and habitat restoration program. Such a program could provide increased flood protection, as well as increased yield from upstream reservoirs, through reductions in flood control reservations. (See the EWC Water Supply Reliability Blueprint for a more complete discussion.) Such a restoration program will require significant pulse flows to maintain healthy habitats and channel morphology. Thus, far from providing environmental benefits, new storage which would decrease peak flows could conflict with the CALFED ecosystem restoration program.

6. The reoperation of existing hydroelectric facilities will not produce "new" water.

Water released as a part of hydroelectric generation currently is either diverted by downstream users, or remains in the environment through the Delta. Although we believe that there may be benefits from hydro re-operation, such reoperation must be scrutinized carefully for cumulative depletion and other environmental impacts as well as impacts on existing water users. We were pleased to hear your comments recognizing these concerns at the March 15 meeting and suggest that this section of the ISI be fleshed out to assure that these issues are fully investigated.

7. The ISI does not distinguish between work needed to make programmatic decisions and site specific investigations which will be used to justify specific projects.

Given the inadequate investigation to date of economics, financing, environmental and other issues, the ISI and the overall CALFED effort should be should be carefully designed to assure that no site specific investigation takes place which goes beyond the needs of CALFED's programmatic investigation. The ISI and all CALFED agencies must clearly and unequivocally recognize that the investigations in the ISI do not suggest

that a decision has been made regarding the need for additional surface storage.

8. The ISI must be carefully constructed to meet the requirements of Section 404 of the Clean Water Act and other environmental laws.

The ISI acknowledges the need to comply with Section 404, and the importance of the Economic Evaluation of Water Management Alternatives and other CALFED investigations to comply with this and other legal requirements. However, the CALFED program, as currently designed, will not provide an adequate foundation for a legally adequate finding of compliance with Section 404. Specific inadequacies include the following:

- CALFED has not adequately defined the "project purpose" under Section 404. Without specific water supply reliability goals, responsible federal agencies cannot evaluate the potential for a variety of alternative approaches to meet the project purpose.

- CALFED has not completed an adequate needs analysis. This will require a comprehensive economic analysis. We are hopeful that the Economic Evaluation of Water Management Alternatives will help meet this need. However, the late start of this analysis means that it is too early to determine if this process is adequately designed to provide needed answers. It is also not clear if the effort will yield results before the preferred alternative is selected. This problem is worsened by CALFED's reliance for its needs analysis on a deeply flawed Bulletin 160.

- CALFED is not fully evaluating the proper range of alternatives. Due to political considerations, CALFED has limited review of the potential water supply benefits of an ambitious land retirement program. Likewise, the CALFED agricultural and urban conservation, water transfer and other programs fall far short of the unbiased, robust evaluation of alternatives required by Section 404.

In addition, CALFED should review other applicable requirements (e.g. CESA, ESA, NEPA, CEQA, public trust) to reveal other issues which must be addressed in the ISI.

9. The ISI must provide a firm foundation for a science-driven, objective evaluation of dam removal opportunities.

Dam removal, and other fish migration barrier removal strategies, have raised opposition from some small but vocal special interests. We welcome this first step towards an objective, comprehensive fish passage program which is a critical part of a CALFED ecosystem restoration program.

10. The ISI must address key groundwater and conjunctive use management issues.

The environmental community believes that both water supply and environmental benefits can be produced through the improved management of groundwater resources. However, the current management regime in California provides little incentive for intelligent, long-term management of groundwater resources. In addition, some stakeholders are advocating new surface storage to help address groundwater problems. Both the CVP and the SWP were justified in part by the need to address groundwater issues. We believe that without addressing fundamental issues, such as groundwater regulation and the metering and reporting of groundwater pumping, CALFED's ISI and Water Management Strategies will be unable to provide significant improvements in water supply reliability.

ATTACHMENT SIX

Environmental Defense Fund
Natural Resources Defense Council
Save San Francisco Bay Association
The Bay Institute

December 9, 1998

Hon. Bruce Babbitt
Secretary of the Interior
U.S. Department of the Interior
Washington, D.C. 20240

Dear Secretary Babbitt:

Thank you for taking the time to meet with us this morning. We appreciate your interest and leadership in the development of a solution to California's water management and ecological problems. We are gratified that as part of the process that you have initiated, CALFED is now seriously considering how to ensure that environmental water is available as necessary for the restoration of the Bay-Delta ecosystem.

The establishment of an Environmental Water Account for Delta export management could be an important tool for biological protection. However, the strawman proposal (Iteration #3, dated Dec. 8, 1998) produced by the Mike Spear and Tim Quinn discussions is flawed and rather than producing assurances of environmental water -- and related ecosystem restoration -- instead could lead to significant restoration problems. We are convinced that the institutional, political and operational issues associated with the Account are both too numerous and complex for lasting resolution in a couple of weeks. For this reason, we strongly recommend that the Revised Phase II Report address this issue at a more workable level by: (1) committing to the development of firm and assured environmental water as necessary to support fully the restoration program over the long term; and (2) setting forth the options that should be developed toward this end in the revised EIS/EIR. These include, at a minimum, instream water rights as well as various approaches to crafting an account for Delta export management.

The following concerns, which are not addressed by the proposal, must be fully resolved before an Account can be included in the CALFED preferred alternative:

1. Use of an Account is grounded on the premise that there is clarity and certainty about the water currently available or committed to the environment, and that water managed under the Account supplements this amount. Because there is intense disagreement on this point, establishing a firm environmental water baseline is essential.

2. Any Account will require precise accounting for a block of environmental water. Nevertheless, DOI has insisted (in the (b)(2) litigation) such accounting is not feasible. It is essential that we avoid the technical problems that have characterized the (b)(2) implementation and ensure that water guaranteed to the environment actually accrues.

3. As proposed, the Account appears to be tied to the expansion of surface water storage. However, it is not the case that new, or existing, storage facilities are necessary for an Environmental Water Account to function properly.

4. The proposal fails to include other options for securing environmental water, both within the Delta and upstream, such as an instream water right, and could be a hindrance to such options. The Phase II document must consider the full range of options for securing environmental water.

5. Some stakeholders have suggested in these discussions that there must be a "balance" between the amount of water made available for restoration and the amount of new water secured for consumptive use. The real balance is between the attainment of objectives for both ecosystem restoration and water supply reliability.

6. The proposal assumes that the ecosystem managers will make the right decisions for the environment so that varying the Delta export standards is appropriate. This is a difficult issue. We support the notion that increased flexibility could have significant benefits for aquatic resources. However, we are reluctant to consider removing the backstop of environmental protection (albeit insufficient) provided by the standards until we have a higher level of confidence that the ecosystem managers will have sufficient authority, and political insulation, to use such flexibility in the most appropriate manner. To the extent that this Account would serve as a principal ESA protection tool, this political question is even more acute.

Overall, the proposal has yet to be comprehensively analyzed to determine fishery benefits or even what size the Account would have to be in order to accomplish its objectives. It is premature to narrow the scope of such an Account until studies have been completed and the legal and policy assurance issues identified above have been resolved.

For these reasons, we urge you to continue to encourage the important task of assuring a sufficient water supply for the restoration program, as well as long-term maintenance beyond the program, and not to undermine this critical task by limiting the consideration of an Environmental Water Account to this particular proposal. Thank you for your consideration of our views. Our organizations look forward to working with you on a workable long-term solution.

Sincerely,

Cynthia Kochler
Save San Francisco Bay Association

Thomas J. Graff/Spreck Rosekrans
Environmental Defense Fund

Hamilton Candee/Ronnie Cohen
Natural Resources Defense Council

Gary Bobker
The Bay Institute

ATTACHMENT SEVEN

Save San Francisco Bay Association
Environmental Defense Fund
Natural Resources Defense Council
The Bay Institute
Friends of the River
Marin Audubon Society
Golden Gate Audubon Society
California Sportfishing Protection Alliance
Surfrider Foundation
Environmental Law Foundation

March 3, 1998

Lester Snow
CALFED Bay-Delta Program
1416 Ninth Street
Sacramento, CA 95814

RE: BDAC Work Group Assurances Proposal

Dear Lester:

This letter contains the comments of the Environmental Water Caucus representatives listed below with regard to: (1) the current draft assurances proposal and (2) the draft assurances research project. We consider assurances to be central to the success of the entire CALFED effort. In our view, the draft proposal fails to address many critical issues, particularly with regard to the ecosystem restoration element of the CALFED program. This letter reiterates and expands upon comments made by EWC members at the assurances work group for the past nine months.

I DRAFT ECOSYSTEM RESTORATION ASSURANCES PROPOSAL

The current "assurances" proposal (the December 1997 and February 1998 iterations) is a skeleton, purporting to outline a comprehensive package covering all aspects of the CALFED program. Notwithstanding the laudable efforts of CALFED staff and the work group, the draft falls substantially short of its task and fails to provide a framework for an assurances program. It is instead, as indicated at the work group meeting on February 24, an implementation strategy. Implementing the CALFED program is not the same thing as attempting to provide "assurances" that the program will meet its objectives.

The staff and work group have identified the major assurance issues around the ecosystem restoration element -- *in particular the concern that* legal assurances tend to break down given sufficient time and political pressure. However, the proposal does not seriously grapple with these

issues and provides little insight into how they might be resolved: How can water necessary for ecosystem restoration be guaranteed? How can we ensure that operations will not conflict with or cause harm to species and habitats? To what extent can sufficient funding for restoration be guaranteed? What remedies are available in the event that the program is not adequately implemented? The current draft does not address these hard questions.

We recognize that absolute guarantees that the CALFED program will achieve all of its promises under all circumstances may not be attainable. Nevertheless, the purpose of an "assurances" package is to set forth mechanisms that provide a high degree of confidence that the program's substantive goals will be met. It should be a strategy that attempts to assure outcomes. The distinction between merely implementing a plan and providing assurances of meeting program objectives is a critical one -- particularly for the ecosystem restoration element which will rely on thousands of discretionary decisions over a long period of time. It is easy to imagine the ERPP being "implemented" with little ecosystem recovery actually occurring -- one need only look at the Columbia River experience discussed below. Mere implementation of a plan, without regard to expected performance, is far less likely to result in achievement of the plan's objectives than an assurance strategy that is focused on performance.

Strikingly, although it lists "tools" and "management structures" and "guidelines," the current draft fails to set forth the basic assurance mechanisms necessary to guarantee that the ecosystem restoration element of the CALFED proposal will be implemented so as to achieve its goals.

For example, under the Ecosystem Restoration section, the draft indicates that there will be some sort of HCP. But what does this have to do with "assuring" that the ERPP will be appropriately implemented? A Habitat Conservation Plan under the ESA is a mitigation measure allowing for harm to species or habitats by some kind of human activity. It is an assurance mechanism for a development interest that its operations will not be disturbed by "surprises." It may or may not be linked with actual protection of habitats or recovery of species. Conversely, "assurances" that endangered species in the CALFED study area will enjoy full recovery and long-term sustainability are: (1) the continued existence and enforcement of the federal ESA and the state CESA; (2) listing of jeopardized species in the Bay-Delta system; and (3) sufficiently aggressive restoration and recovery strategies.

Another example of the proposal's focus on implementation instead of assurances is the limited discussion about funding. Although there is agreement that funding is a key element of the assurances necessary for the ecosystem program, the draft fails to make this point and merely identifies currently existing pots of money and recommends merging them. How does this "assure" that sufficient funds will be available to carry out the ERPP?

We recommend that the assurance proposal be revised to include the following:

Assurance Mechanisms for the Ecosystem Restoration Element

1. Strong ERPP with measurable performance standards
2. Legal mandate(s) to achieve performance standards
3. Institution dedicated to program implementation with sufficient authority
4. Water
5. Funding
6. Enforcement of baseline environmental statutes
7. Physical constraints on new water development facilities
8. Controls on water project operations
9. Phasing/linkages of other program elements to the progress of the ecosystem element
10. Remedies

Some of these assurances have been discussed at length in the work group, such as the establishment of a new institution. Some are the province of other work groups, such as the development of the ERPP and performance measures. Other elements have not yet received the serious attention required to formulate a viable assurance package for the ecosystem program. In our view, the "assurances" discussion requires clear articulation of the ten assurance mechanisms listed above, and further requires specific proposals for putting such assurances into place.

The single assurance mechanism that has been addressed in substantial detail is the proposal for a new institution to oversee the restoration program. We agree that this is a necessary and even critical element of the package; but it is not, as the draft seems to suggest, a sufficient one. The establishment of a new institution to implement the ERPP is not in itself a guarantee that the program will be adequately implemented.

Our specific comments and recommendations are below.

1. Strong ERPP/Conservation Strategy with Performance Standards

The assurance challenge with regard to ecosystem restoration is two-sided:

(a) Ensure that appropriate restoration occurs; and
(b) Ensure that facilities creates no new ecological harm.

Thus, on the one hand, CALFED must craft a program to restore natural functions, habitats and species that have been radically altered, degraded and depleted over a long period of time. On the other hand, it must simultaneously craft a program to avoid (or mitigate) new harm to these resources that may be caused by water facilities (and other CALFED program elements). In our view, these tasks -- affirmative restoration and impact mitigation -- are one and the same and should be part of a fully integrated, self-mitigating restoration plan.

However, until recently, CALFED seemed to be moving toward an approach that addressed the affirmative restoration program (the ERPP) and the impact mitigation program (the HCP) as somewhat distinct. CALFED is now moving toward a comprehensive "conservation strategy" bringing these two perspectives together in a single program. While we have not seen this new strategy, we concur with the initial description provided to EWC that the mitigation responsibilities should be built upon, and be additive to, the affirmative restoration program. We will refrain from offering any other comment until the conservation strategy has been made available for review. In general, however, this appears to be a more productive approach to the interdependent issues of restoration/recovery and mitigation.

A prerequisite for satisfactory ecological recovery and protection is a high quality plan. Our comments on the draft ERPP have been provided previously to CALFED and we will not repeat them here. The sufficiency of the plan's implementation cannot be gauged without meaningful performance standards. The assurances package should be structured to ensure the achievement of substantive performance standards for the ecosystem restoration plan.

The draft assurances proposal does not reflect the considerable discussion and agreement within the Ecosystem Restoration Work Group about the need for clear performance standards as part of the ERPP. While the establishment of such standards is beyond the scope of the assurances work group, it is essential that they are part of the ERPP. Success should be measured by improvements in the health of the ecosystem. If the ERPP (and the adaptive management program in particular) guarantees only that money and effort will be expended, but fails to identify the environmental improvements that must be accomplished, the efficacy of the entire program is in question.

Performance should be defined by a combination of the ERPP "performance objectives" and a set of ecological indicators that are expected to be achieved in a specified time frame. These objectives and indicators should include defined numerical ranges. Time frames for achieving differing objectives will necessarily vary among objectives and indicators. We recommend that time frames be assigned according to the amount of time that experts anticipate will elapse before the system shows a measurable response to the restoration actions. For example, it may be useful to determine which performance measures are capable of detecting changes at the two-year, five-year, ten-year, and twenty-year intervals from the time the ERPP implementation begins. Where performance measures are not being met, the assurances package should provide for remedial action within a time certain.

We recommend that the ecosystem plan establish measurable performance objectives that can serve as the focus for the assurances proposal. It may be useful to convene an inter-work group committee (ecosystem restoration and assurances) to develop a specific proposal with regard to performance measures. An analogous effort should be undertaken for each of the common programs.

2. Legal Mandate(s) To Achieve Performance Objectives

Measurable performance standards for the ecosystem program will not be self-executing if they are simply part of a planning document. Achieving these standards must be a central part of the mandate of whatever institution is tasked to implement the ERPP. Achievement of the ecosystem performance standards must also be linked to the provision of other CALFED benefits. (See "phasing/linkages" below.) Such a mandate can come in many forms -- from incorporation in an informal agreement between existing agencies or part of the legal directive from state and federal agencies to a new institution. We believe that whatever agencies or institutions carry out the ERPP, their obligation to attempt to achieve the performance standards should come in the form of a legislative directive to ensure the highest degree of confidence that they will be achieved. (See "remedies" below.)

Having made this recommendation it is not our proposal (or our intent) that the implementing institutions be locked into an irrevocable set of rigid legislative enactments. We believe that it is entirely possible to craft legislation establishing that the attainment of the performance objectives is a legal requisite while providing substantial flexibility for dealing with contingencies and the vagaries inherent in an adaptive management situation. However, without a substantial commitment to the attainment of the performance objectives for ecosystem restoration in some form, it cannot be said with any confidence that implementation of the ecosystem program can be "assured," let alone guaranteed.

The draft proposal touches on the issue of commitment to implementation of the CALFED programs in the "program-wide assurances" section. The draft explores only two options -- an informal agreement modeled after the Bay-Delta Accord and an implementation plan. We have previously commented that the Accord model is not easily transferred from a relatively limited set of agreements to a massive program with thousands of assurance and implementation issues and details. While an implementation plan is a more flexible tool for devising a strategy and identifying issues for resolution, such a plan does not constitute a mandate or commitment to implement.

In addition to setting forth an implementation strategy, we recommend that the assurances package explore a range of options available for formalizing a mandate to achieve the ecosystem performance objectives described above, including specifically federal and state legislation.

3. Implementation Institution

This is the one element of the assurances package that has received considerable analysis in the work group. Our comments address: (1) need for a new institution; (2) scope of authority; (3) powers; (4) type of institution; (5) governance; and (6) independent review.

Need for a New Institution. The draft appropriately identifies a range of institutional alternatives. In our view, there is little question that some type of new institutional arrangement is essential if the ecosystem restoration program is to have any change of success for at least three reasons. First, as in other parts of the country, the current highly degraded state of the Bay-Delta

estuary has been caused in part by the fragmented system of jurisdiction over the affected region and its natural resources. "Coordinating" among more than a dozen state and federal agencies is never going to be as efficient or effective as simply consolidating responsibility for implementing the program in a single place. Second, the job calls for a regional entity rather than a purely state or federal one. Third, the type of authority required to adequately implement the ecosystem program transcends the current jurisdictional boundaries of any one existing agency.

Scope of Authority. The draft states that a new entity would have responsibility for implementing the ERPP and managing environmental water. In addition, the implementing institution should have a major role in governing the operations of the state and federal water projects, at least insofar as potential conflicts with the ecosystem and the ERPP are concerned. (See "controls on project operations" below.)

Powers of the Institution. A weak institution without real power to carry out its job would be unacceptable. Yet the current draft fails to identify how the new entity would procure either the funds or water necessary to carry out the ecosystem program. (See "funding" and "water" below.) In addition, although various assurance proposal drafts have referred in passing to the ability of the entity to acquire and hold water rights, this concept has not been thoroughly examined in the assurance proposals to date. California does not yet recognize a right to instream flows other than through the transfer provisions of the Water Code. This is a limited and awkward device on which to premise the entire ability of an institution to acquire environmental water. The draft also implies that the entity would obtain an appropriative right to newly developed water. We recommended that the draft be revised to include a substantial analysis of the options available for a new entity to hold long-term rights to environmental water, including the establishment of an instream water right.

Public/Private Institution. The draft assumes that a new institution would be a public agency. This may ultimately prove to be the most effective model, but we recommend that the draft be revised to explore other options as well, including quasi-public entities such as a public corporation or private entities such as a non-profit or a trust. These institutions have certain advantages over public agencies that at the very least should be aired for public discussion.

Governance. The draft posits a governing structure for a new institution limited to the CALFED agencies. This is troubling for several reasons. First, it represents a significant imbalance in the broader program. If the water project operators are going to govern the ecosystem recovery program, then the ecosystem managers should govern the operation of the water projects. Second, while it will be difficult to remove political influences from the governing body of the ecosystem entity, this organization should be run by individuals devoted to the mandate of ecosystem restoration and recovery to the maximum extent possible. This may include agency representatives, but it may also include non-governmental individuals as well. Indeed, if there is an overall CALFED supervising body (as has been proposed), it may not be necessary or desirable to have any governmental representation on the governing board. We recommend that the draft be revised to reflect a range of governance options for a new institution

including a board dominated by those with an ecological orientation.

Independent Review. Ongoing scientific judgment must be exercised: (1) to oversee the efficacy of the adaptive management in achieving the performance standards; (2) to interpret the quantitative data (e.g., what does it mean when some indicators go up and others go down?); and (3) to recommend changes in ERPP performance standards and indicators based on new scientific understanding. The judgment required for these tasks must come from an independent science body to avoid politicization of what must be a strictly scientific exercise. For this reason, we concur with the recommendation of the ecosystem restoration work group that such a panel be formed as part of the new institution, and that it be charged with responsibility for at least the tasks listed above, and to provide an annual assessment of the ERPP's progress in achieving the performance standards.

4. Water

Water for the environment is a central element in assuring the effective and successful implementation of the ERPP. However, the draft assurance proposal makes little effort to address how to assure the requisite environmental water. Moreover, it appears to adopt a very limited and wholly inadequate view of the water that will be necessary for restoration purposes identifying only the need for new supplies to meet unspecified "minimum flow standards."[1] The draft assumes that any other water needed for environmental purposes will be obtained exclusively through water markets. Finally, it assumes that funding will be available to purchase such water and that the implementing entity will be have the appropriate authority to hold such water.

As discussed above, a key omission from the draft proposal is discussion of how the implementing entity will hold water rights or otherwise control the availability of water for the environment. The importance of this issue cannot be overstated, particularly in light of the immense difficulties in implementing the CVPIA mandate to dedicate 800,000 acre-feet of CVP water to the environment. Regardless of the merits of that dispute, it is clear that assigning water to the environment involves a host of complex issues.

While we agree that there is substantial merit to exploring the potential of a vigorous water transfer market, this option alone -- without guaranteed baseline flows -- is unlikely to be sufficient to assure that water for the environment will be available when and where and in the quantities necessary to fully implement the ERPP and meet the appropriate performance standards. The proposal should discuss the potential and the limits of water transfers to provide the requisite environmental water and the extent to which such reliance is an appropriate

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[1] This is in part a problem in the ERPP itself which fails to provide an analysis of the flows deemed essential to achieve restoration. We have previously commented on the inadequate discussion of flows in the draft ERPP. For purposes of developing an assurances proposal, it must be assumed that environmental water is part of the mix and the task for this portion of the EIS/R is to ensure that such water -- in whatever quantity -- is available for the environment.

"assurance."

We recommend that the assurance proposal address the non-market provision of environmental water so that adequate baseline flows can be assured. Appropriate mechanisms in this regard include, but are not limited to: (1) water quality standards and accompanying water rights; and (2) assignment of CVP and/or SWP water to the ERPP implementing entity.

5. Funding

Even a brief review of the draft indicates that one of the central assurance mechanisms for the ecosystem program is a steady, protected stream of funding. Virtually the entire program hangs on the ability of the implementing entity -- whatever it is -- to spend large amounts of discretionary fund on restoration projects, on research, on monitoring, and perhaps most importantly in water markets. Yet the assurance proposal contains virtually no analysis of this issue notwithstanding our having raised it on many occasions. Reliance on the capriciousness of state and federal appropriations is not an "assurance" of any kind. While some funds have been procured through state bonds and federal authorizations, they are by no means certain. The federal appropriation was somewhat over 50% of the authorization for fiscal year 1998 and appropriations in future years are entirely uncertain. Proposition 204 funds are highly contingent on a political process and there is substantial question about whether such funds will ever become available.

We recommend that the draft be revised to analyze funding scenarios for each of the program elements, e.g., reliance on annual federal and state appropriations, user fees, G.O. bonds, etc., from an assurances perspective and assess the extent to which funding for the ecosystem program can or cannot be "assured."

6. Enforcement of Baseline Environmental Statutes

The draft assurances proposal does not address the issue of the environmental regulatory baseline or its relationship to the question of how to assure the success of the ecosystem restoration element of the CALFED plan. As we have said on many occasions, maintenance of the environmental baseline is an essential assurance for the CALFED program. In our view, this baseline includes environmental protection statutes that exist and are enforceable in the absence of the CALFED effort including but not limited to the federal Clean Water Act (and its state analogue the Porter-Cologne Act), federal and state endangered species statutes, the CVPIA, and safe drinking water statutes.

These laws establish requirements for water quality standards, dedicate a specified amount of CVP water for environmental use, establish funds for habitat restoration and water acquisition, and provide safety-net protections for species that have been severely stressed. The CALFED program can succeed only if this basic bedrock is in place and functioning. For example, full implementation of legally defensible CWA water quality standards is fundamental to assuring the

success of the ERPP.[2] Ensuring the integrity of the environmental baseline is particularly critical in light of recent efforts to erode that foundation. These efforts include but are not limited to:(1) amendments to the ESA; (2) cuts to the CVPIA restoration fund; and (3) proposals to weaken current water quality standards.

The most potent assurance mechanism available to protect endangered species in the CALFED planning area would be federal and state listing of those species currently eligible under the legal standard, such as spring run Chinook salmon, longfin smelt, Sacramento splittail and others.[3] Such listings would elevate the attention given to the ecosystem functions and habitats relevant to the continued survival of those species in both the ERPP and the developing conservation strategy. Listing also provides the public with legal options in the event that the ERPP and conservation strategies fail to perform as required. (See "remedies" below.)

The other advantage, from an assurances perspective, of listing jeopardized Bay-Delta species is that such listings must be taken into greater account in the operation of water projects, and other facilities, that can adversely affect the ecosystem restoration effort. If the ERPP and conservation strategy are well-designed and fully integrated with the water reliability and other CALFED program elements, the actions necessary to restore habitat and to avoid further or new harm to such species will be in place. Of course, this outcome may occur even without the added impetus of new listings; nevertheless, this legal incentive makes the likelihood of the plan's sufficiency that much greater.

7. Physical Constraints

In our view, the current proposal does not does not come close to assuring that operational criteria for reservoirs and conveyance facilities will survive as intended, and we are skeptical that such criteria can be fully "assured" over the long term. For example, storage constructed ostensibly for the limited purpose of capturing "surplus water" in very wet years is likely over time to be employed to divert ever more water out of rivers and streams necessary for environmental health. There is no legal arrangement or agreement that will not break down given sufficient political pressure over time.

The assurance proposal has touched on this issue at various points but has not really

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[2] Prior versions of the assurance draft have included the proposal that the integrity of the water quality standards could be assured by an agreement for the water projects to "indemnify" the environmental entity with water and/or money if water quality standards are relaxed. The status of this proposal in the current draft is unclear. Moreover, considerable additional detail is required to flesh out this concept.

[3] Spring run salmon is a candidate species under the state endangered species statute and has recently been proposed for listing under the federal law. Federal listing petitions for longfin smelt, Sacramento splittail and other Delta dependant species are pending.

analyzed its implications for the development of the preferred alternative. We recommend that the assurances proposal be revised to examine: (1) the extent to which the operation of new facilities can be "assured," particularly using a system of automatic defaults (see "phasing and linkages" below); and (2) whether the assurance issues inherent in physical limits on new facilities are appropriately considered in the development of the preferred alterative.

8. Controls on Project Operations

As discussed above, the ecosystem restoration objectives can be assured only through a two-pronged approach that weds affirmative restoration actions with protections against harm that could be caused by new program elements, water project operations in particular. A key assurance mechanism must include controls over the storage and conveyance components of the state and federal water projects. The assurance work group has addressed this issue in a limited fashion and has in the past proposed specifying the operational rules for facilities in bond language. The current draft proposal does not include controls on project operations as an assurance mechanism for the ecosystem program.

In our view, such controls are key to a successful ERPP and conservation strategy. Such controls can take several forms:

First, a basic "ecosystem-friendly" operations plan should be crafted that establishes protection of natural processes, functions, habitats and species as a key factor in project operations.

Second, the current "Ops Group" and "No Name Group" should be replaced by a new committee to oversee operations and address conflicts between the ERPP/conservation strategy implementation and project operations as they occur. The new environmental entity should convene this committee.

Third, as indicated above (see "governance"), if the environmental authority is to be governed in part by water user/development interests, the governance structure for the federal and state water projects should be revamped to include substantial control by environmental interests. It is essential that the assurance package provide a basic level of parity in the governance of the water management and ecosystem restoration authorities.

We recommend that the assurances proposal be revised to explore these three recommendations.

9. Phasing and Linkages

The current phasing plan does little more than establish a schedule for implementation. It does not function as an assurance mechanism weaving together the various commitments of the CALFED program in a mutually dependant manner. We recommend that the phasing plan be

revised in accordance with the following principles:

A. Irreversible commitments benefitting one group should be linked to irreversible commitments that benefit others. For example, funding and permitting for a specific new storage facility should be linked to deed restrictions protecting a certain amount of previously unprotected habitat from alternative uses. To explore appropriate linkanges and craft a phasing plan that is more than a schedule, it would be useful to lay out each piece of the performance package (including performance standards for each of the common programs) and determine at least the following:

(1) What is the time frame for completion of this implementation task?
(2) Are there any interim milestones that will be completed in less time?
(3) How reversible is this piece of the solution?

Other issues will be relevant to this analysis as well.

B. The phasing program should tie smooth implementation of components that can be disrupted to the benefits of all parties. For example, if the ecosystem restoration program depends upon a functioning water market and the ability to transport purchased water, then some significant component of water user supply also should be dependant upon the a functioning water market and the ability to transport purchased water. In this way the temptations of parties to undermine the advances of different program elements may be lessened.

C. Ensure that blocking implementation of any portion of the CALFED package is not in the interest of any party. A system of "mutually assured defaults" should be built into the implementation strategy so that failure to achieve the results specified in the performance package in the specified time frame would have known consequences that are less desirable to all parties than achieving such results. As currently proposed, there appears to be no barrier to one part of the program proceeding even if others are stymied. For example, what would occur if federal and state governments refuse to implement or fund portions of the ERPP? The current proposal does not appear to limit the ability of water user benefits to go forward in such a situation. Mechanisms must be put into place that make all program elements inter-dependant, particularly with regard to program funding.

D. Provide "certainty" to parties in a manner inversely proportional to the elapsed time. For example, a "no surprises" policy that is limited in scope and application might be appropriate during a five year period for certain actions, but the commitments included would become less certain at the ten, fifteen and twenty year points.

E. To the extent that much of the assurance package is based on institutional fixes, these should be put into place before other commitments are fulfilled. The current phasing plan seems to move in this direction calling for legislation prior to the construction of new facilities. However, as discussed above, default mechanisms are required to ensure that institutions are fully

functioning and funded before major new facilities are constructed.

10. Remedies

We are all hopeful that CALFED succeeds, that the Program staff develops a long-term plan acceptable to all constituencies, that the plan is fully funded and implemented, and that all of the pieces move forward together in harmony. Nevertheless, it is essential that the public have remedies available to it if all other assurances strategies fail. This is particularly true for the ecosystem program which is inherently dependant upon thousands of discretionary actions, and contains a high degree of uncertainty.

Remedies can include existing tools such as citizen enforcement under the ESA if the plans fail to protect listed species (this is why it is key that all eligible species are listed). However, new remedies should be made available as well. For example, we should consider enabling legal action in the event that the ERPP/conservation strategy performance standards are not met or if projects violate the terms of the operating rules. intended to benefit the environment.

We realize that such proposals are likely to be controversial. Nevertheless, we believe that the system must contain fail-safes to discourage defaults in program expectations as well as to provide relief. Such measures can be crafted in a limited way that makes them available only when the circumstances warrant. We recommend that the draft assurance proposal be revised to address the issue of remedies.

II DRAFT ASSURANCES RESEARCH REPORT

The draft report is a very useful document and long overdue in the CALFED process. Many in the conservation community have requested that the agencies take a hard look at how ecosystem conflicts have been addressed in other parts of the country. In addition to the case studies contained in the report, we recommend that CALFED look at the operation of the Exxon Valdez Restoration Trust Fund and the programmatic difficulties that have been faced by the salmon recovery program in the Columbia River Basin. The Columbia River offers the most disturbing parallel to the Bay-Delta conundrum because over the last decade or so about $1 billion has been spent on a salmon program that is now widely admitted to be a failure. We offer two recommendations for expansion and revision to the report.

A. Put Lessons In Context

The primary flaw in the draft is that it does not draw clear distinctions between, or parallels to, the Bay-Delta situation in each of the case studies. This limits the extent to which lessons can be taken from these other programs. For example, based on the information provided, the Everglades seems to provide the closest problem analog to the Bay-Delta of the three situations described, while the Chesapeake appears to be the most distinct.

The Everglades involves, roughly, long-term degradation of a large natural resource caused largely by certain agricultural practices and government water projects that produce important social and economic benefits regionally at the expense of radical changes in ecosystem functions. It also involves contentious stakeholders, a history of litigation, and federal and state political and legislative action before the parties were able to come together in an implementation mode.

By contrast, the problems confronting the Chesapeake do not appear to have been as divisive -- there seems to have been a high degree of consensus among the players regarding the value and urgency of protecting the natural resources at issue and no single economic or governmental interest that was invested in a set of practices inherently in conflict with such protection. The largest problem faced by the Chesapeake example is inter-state coordination -- a factor that does not exist in the Bay-Delta scenario.

This is not to say that the lessons from the Chesapeake or Columbia River Gorge case studies are not important -- they clearly are. However, tools and approaches that have worked in one place may have a great deal to do with the political/economic/resource landscape rather than merits intrinsic to those tools and approaches. Analysis of this kind is lacking in the report.

B. Look at the Columbia River Salmon Recovery Programs

We strongly recommend broadening the report to consider what can be learned from the effort to address Columbia River salmon issues. This effort seems to contain the closest set of problems -- both ecologically and institutionally -- to those faced in the Bay-Delta situation. In addition, as a multi-year, multi-billion dollar effort aimed at restoring salmon, it has critical lessons to teach. The parallels are striking; in 1987, the parties established a "fish doubling" goal for themselves and fish populations actually declined. Most of the other efforts aimed at establishing self-sustaining populations of anadromous fish in the region have fallen wildly short of their goals as well. The primary culprits appear to be:

(1) lack of good recovery planning;
(2) dispersed authority, largely in the hands of dam operators; and
(3) reluctance to make major changes that would affect traditional water users.

It is essential that we understand what went wrong and what, if anything, has gone well in the Columbia system and that we put those lessons into practice in crafting the assurance package for CALFED.

Thank you for your consideration of our views. We look forward to working with you as these issues continue to develop.

Sincerely,

Cynthia Kochler
Save San Francisco Bay Association
on behalf of

Terry Young
Environmental Defense Fund

Betsy Reifsnider
Friends of the River

Gary Bobker
The Bay Institute

Richard Izmirian
California Sportfishing Protection Alliance

Barbara Salzman
Marin Audubon Society

Arthur Feinstein
Golden Gate Audubon Society

Peter Candy
Surfrider Foundation

Ann Notthoff
Natural Resources Defense Council

Jean Auer

Tara Mueller
Environmental Law Foundation

cc: CALFED Policy Team
CALFED Management Team

ATTACHMENT EIGHT

98-294

October 14, 1998

Mr. Robert Perciasepe
Assistant Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Mr. Douglas Wheeler
Secretary
Resources Agency
1416 Ninth Street, Suite 1311
Sacramento, CA 95814

Dear Gentlemen:

Thank you for inviting us to attend the recent CALFED Policy Group meeting in Sacramento. We write to provide you with some answers to questions raised at that meeting regarding the need for a new institution of some kind to implement CALFED's Ecosystem Restoration Program (ERP).

As you are aware, over the last year or more, our respective caucuses, as well as other stakeholders participating in CALFED's Assurances Work Group, have concluded that some type of new entity may be the most efficient way of implementing the ERP and the Strategic Plan. This conclusion is based on several considerations.

First, to be successful, this effort should be fully merged with other scattered and parallel efforts to restore Central Valley species and habitat types. Merely "coordinating" among agencies with different mandates and different perspectives is less efficient and therefore less likely to achieve lasting long-term results. This is not to say that we have any interest in eliminating or lessening any currently existing authorities or mandates. Rather, by bringing together all of the relevant agencies working on a single integrated program, the ecosystem is likely to achieve greater benefits.

Second, the kinds of authorities necessary to implement the program are now scattered among various state, federal, local and even non-profit entities. Rather than piecemealing implementation of the program among these entities, we are recommending that we design an entity to suit the task of implementing this program with the appropriate prerogatives and powers. None of the natural resource agencies, to whom the implementation task would largely fall in the absence of something new, are currently structured so as to undertake long-term implementation for a program of his magnitude.

Third, the program will be best served by a structure that includes both federal and state governments. Delegating responsibility for the ERP implementation to one or the other will result in practical as well as political problems.

Fourth, the current structure is untenable. The ERP and Strategic Plan are unlikely to be successful without a permanent professional staff dedicated to program implementation over the long-term. CALFED as it is currently structured has no legal existence. This severely limits its capacity and flexibility to conduct even the most basic hiring and contracting functions.

The difficulties experienced by CALFED staff in administering the Category 3 funds provided by Proposition 204 are illustrative of this problem. Since these funds could not be appropriated to the CALFED Bay-Delta Program directly, they were directed to the Resources Agency. Since Resources did not have sufficient staff to handle the program, the funds were transferred to a third agency, a contract had to be negotiated effectuating the transfer and a fourth entity was brought in to administer a portion of the funds. It took months to resolve these issues and awards that were announced in December of 1997 did not begin going to contract until the summer of 1998. A number of approved projects are still awaiting contracts. These problems have raised serious questions about the program with congressional appropriators and may jeopardize future funding.

Moreover, projects implemented with funds from multiple sources are subject to multiple, and differing, requirements. Thus, under the current structure, a single ecosystem project may be implemented through a myriad of state contracts, federal cooperative agreements from several agencies, EPA grants, NFWF agreements. Each of these vehicles has its own particular requirements and can result in different, or even conflicting, treatment of project proponents. (For example, federal and state standard insurance and indemnification requirements differ.) There are other serious problems with the current structure that preclude it from providing any assurance of an effective implementation vehicle for the ecosystem program.

As a final note, we would like to address directly a concern raised at the CALFED meeting that perhaps the stakeholders are pressing for a new entity as a way of increasing their control over the ERP and limiting agency involvement. As we stated, this is incorrect. Under the current structure, the stakeholders already have substantial input to CALFED's pre-implementation ecosystem planning and spending via the Ecosystem Roundtable. Our proposal for a new entity does not depend upon an increased role for stakeholders beyond the current level, although the form of that involvement could be somewhat different.

Please do not hesitate to call us if you have any questions.

Sincerely,

Cynthia L. Koehler
Save San Francisco Bay Association

Clifford W Schulz
The Ag/Urban Group

ATTACHMENT NINE

Opportunities for Delta Reuse of Clean Material Dredged from San Francisco Bay

Phase II Report: Conceptual Design

Prepared For

The California Coastal Conservancy's
Dredged Material Reuse Program
With support provided by the Pew Charitable Trusts

August 1999

SAVE THE BAY Save San Francisco Bay Association
1600 Broadway Ste. 300, Oakland, CA 94612 • 510/452-9261 • www.savesfbay.org

Acknowledgements

We would particularly like to thank several individuals who were extraordinarily helpful in the preparation of this report: Curt Schmutte and Bill Heyenbruch with the California Department of Water Resources, Rick Olejniczak, Laurel Marcus, Jaime Michaels with the San Francisco Bay Conservation and Development Commission, Len Cardoza with the Port of Oakland and Neal Fishman, formerly with the California Coastal Conservancy.

Primary Author: Barry Nelson
Research and Writing: Cynthia Koehler, William Summer
Editing: Mimi Kusch
Design: Francisco Nieto

III. The Opportunity for Delta Reuse

Habitat restoration, particularly in the western and central Delta would have significant environmental benefits. Yet the volume of material required to fill in subsided islands and provide for levee maintenance would be enormous. Material from Delta sources could only provide a fraction of what is needed.

Habitat Restoration

1. Historic Losses and Environmental Values.

From 1850 to 1940, the vast majority of the Delta was converted from tidal wetland habitat to diked farmland (see figures 3 and 4). CALFED estimates that in the western and central Delta, 86 percent of historic tidal wetland habitat has been lost, and that there are only 5,040 acres of fresh emergent wetland vegetation in this critical portion of the Estuary. This massive habitat conversion eliminated important spawning and rearing habitat for a wide variety of fish species and is a significant cause of the declining health of the Estuary ecosystem.

Downstream migrating juvenile anadromous fish from the Sacramento and San Joaquin Rivers meet at the western and central Delta on their way through the Estuary. CALFED staff has identified four different migratory fish corridors through the Delta—the north, east, and south Deltas and the San Joaquin River—all of which converge in the western and central Delta.

This portion of the Estuary also holds particular importance because of the relationship between habitat and salinity levels. An investigation sponsored by the San Francisco Estuary Project (which subsequently became the foundation of the Bay-Delta Accord) clearly indicated the ecological importance of the part of the Estuary where salinity near the bottom is two parts per thousand (the two-part-per-thousand near-bottom isohaline is referred to as X2). The technical report prepared by a team of scientists for the San Francisco Estuary Project found that "the position of the near-bottom two part per thousand isohaline is an index of habitat conditions for estuarine resources at all trophic levels, including the supply of organic matter to the food web of Suisun Bay, an important nursery area."[6]

Suisun Bay is so critical as a nursery area partly because it is the most easterly point in the Estuary where there is extensive shallow water and emergent habitat. During dry years, when salinity intrudes from the broad, marsh-fringed Suisun Bay into the deep, narrow, riprapped channels of the western Delta, many fish species suffer significantly (see figure 5). The impacts of the eastward intrusion of salinity during dry years are perhaps most clearly indicated by the plight of the Delta smelt, which is listed as threatened under the state and federal endangered species acts.

The "X2" standard is a voluntary salinity limit agreed upon by the CALFED agencies in the Bay-Delta Accord. Figure 13 shows the maximum intrusion into the Delta for the 1 part per thousand salinity gradient. For each of the years indicated in Fig. 13, the location of "X2" would be just down stream.

On an acre-for-acre basis, habitat restoration in this portion of the Estuary would have extremely significant benefits. However, the CALFED program has established relatively modest goals for tidal marsh restoration in this part of the Estuary.

The first CALFED draft Ecosystem Restoration Program Plan (ERPP) recommended very modest habitat restoration goals for the Central and West Delta Ecological Unit. The June 1999 revised draft ERPP called for the restoration of 2,500 acres of shallow-water habitat in this region.[7] It also called for 30,000 to 45,000 acres of marsh restoration in the entire Delta. However, the document does not provide a tidal-marsh restoration goal for the western and central Delta.

The draft ERPP has been criticized for a number of reasons, including its lack of specific and aggressive restoration goals. The revised draft ERPP (with the same goals for the central and western Delta) was released in June. Conversations with CALFED staff indicates that there is still an opportunity to modify these regional goals.

The Recovery Plan for Native Resident Fishes of the Sacramento-San Joaquin Bay-Delta Estuary also recommends that Delta islands and islands in the Suisun Marsh be restored to provide habitat for fish spawning and rearing. The Comprehensive Conservation and Management Plan prepared by the San Francisco Estuary Project contains complementary recommendations regarding wetlands restoration and the preparation of regional wetlands management plans.

Table 1 - Selected Species That Would Benefit from Habitat Restoration in the Western and Central Delta

Species	Status
Delta smelt	TS, TF
Winter-run Chinook salmon	ES, EF
Spring-run Chinook salmon	P
Fall and late-fall Chinook salmon	P
Splittail	FT, C
Longfin smelt	
White sturgeon	
Green sturgeon	
Steelhead trout	
Striped bass	
Sacramento perch	
Sacramento blackfish	
Largemouth bass	
White catfish	
Sacramento squawfish	
Tule perch	
Threadfin shad	
Pacific herring	
Starry flounder	
Bay shrimp	
California black rail	TS
Suisun song sparrow	

Key

- TS: Threatened under the California Endangered Species Act
- TF: Threatened under the federal ESA
- ES: Endangered under the California ESA
- EF: Endangered under the federal ESA
- C: Candidate for listing under the California ESA
- P: Proposed for listing under the federal ESA

Source: CALFED Ecosystem Restoration Program Plan

Marine and estuarine species, which inhabit the lower, more saline reach of the Estuary, would also benefit from Delta habitat restoration. The destruction of habitat in the Estuary, the diversion of a large portion of natural fresh-water outflow, and the recent arrival of voracious non-native filter feeders (for example, *potamocurbula amurensis*) in the Estuary have led to depressed levels of phytoplankton in Suisun Bay, the western Delta, and in the Estuary. By increasing primary productivity, habitat restoration in the Delta would benefit species that do not, or at least rarely, occupy the Delta.[8]

It is important to note that Delta islands currently support wildlife and other environmental values. However, most of these islands are managed primarily for agriculture. Therefore, there is ample opportunity to protect and enhance existing natural resource values on these Delta islands as a part of a restoration program with an ambitious tidal wetland restoration component.

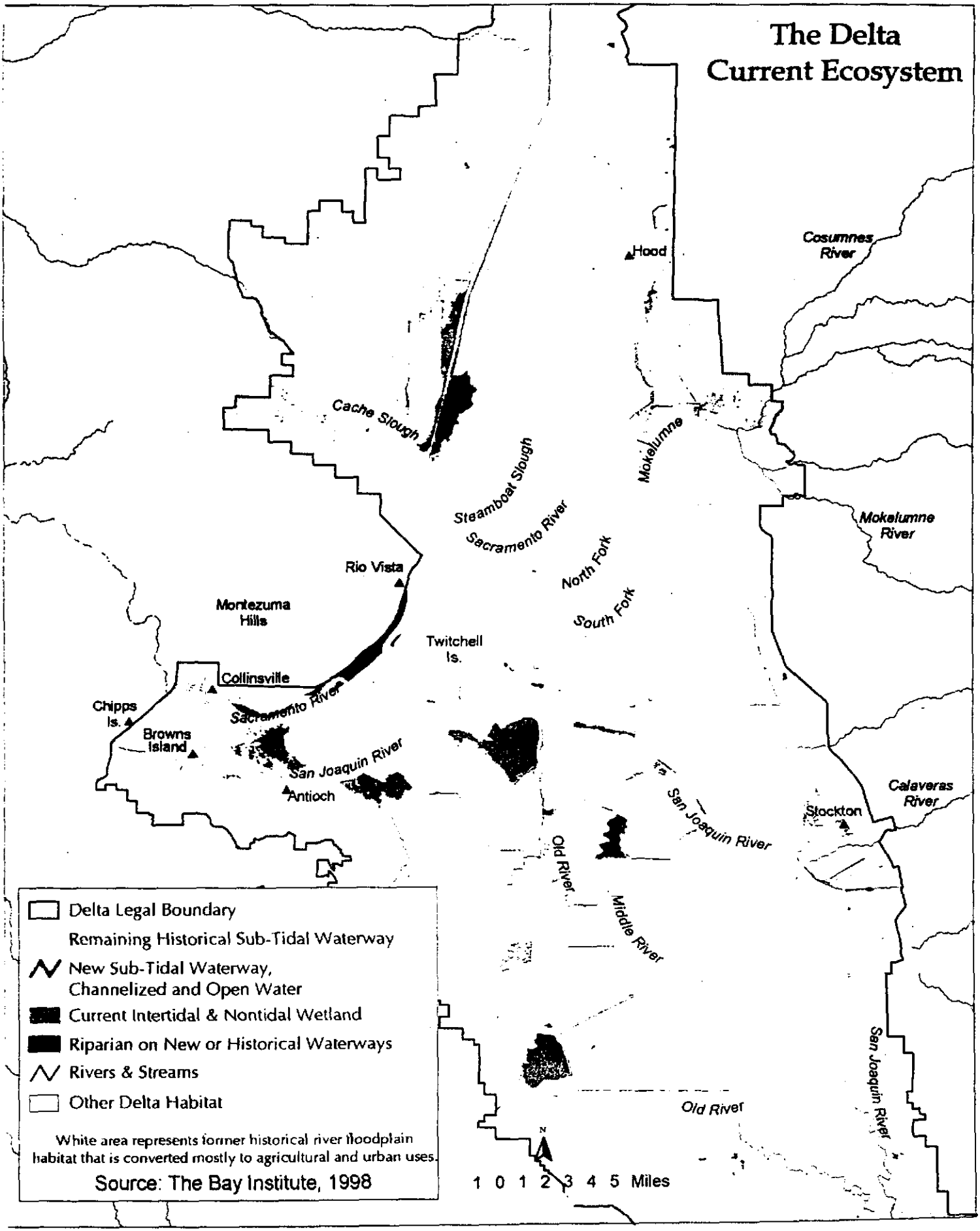
A wide variety of ecosystem restoration plans indicate that tidal habitat restoration in the western and central Delta is a key component of any systemwide restoration plan and offers the potential to benefit a broad range of species (see Table 1). However, the CALFED program contains surprisingly modest and ambiguous tidal habitat restoration goals for this region.

2. The Subsidence Constraint

The reason for CALFED's relatively modest shallow-water restoration goal for the western and central Delta and its ambiguity regarding Delta tidal wetland restoration goals is clear—the challenges presented by land subsidence.

The Dredging and Sediment Disposal section in the draft ERPP clearly endorses the concept of Delta reuse:

> Dredged material disposal would be environmentally sound and the use of nontoxic dredged material would be promoted as a resource for restoring tidal wetlands and other habitats, reversing Delta island subsidence, and improving dikes and levees.[9]


The Delta
Current Ecosystem
Hood
Cosumnes River
Cache Slough
Steamboat Slough
Sacramento River
Mokelumne
Mokelumne River
North Fork
South Fork
Rio Vista
Montezuma Hills
Twitchell Is.
Collinsville
Chipps Is.
Browns Island
Sacramento River
San Joaquin River
Antioch
Stockton
Calaveras River
San Joaquin River
Old River
Middle River
Old River
San Joaquin River
Delta Legal Boundary
Remaining Historical Sub-Tidal Waterway
New Sub-Tidal Waterway, Channelized and Open Water
Current Intertidal & Nontidal Wetland
Riparian on New or Historical Waterways
Rivers & Streams
Other Delta Habitat
White area represents former historical river floodplain habitat that is converted mostly to agricultural and urban uses.
Source: The Bay Institute, 1998
N
1 0 1 2 3 4 5 Miles

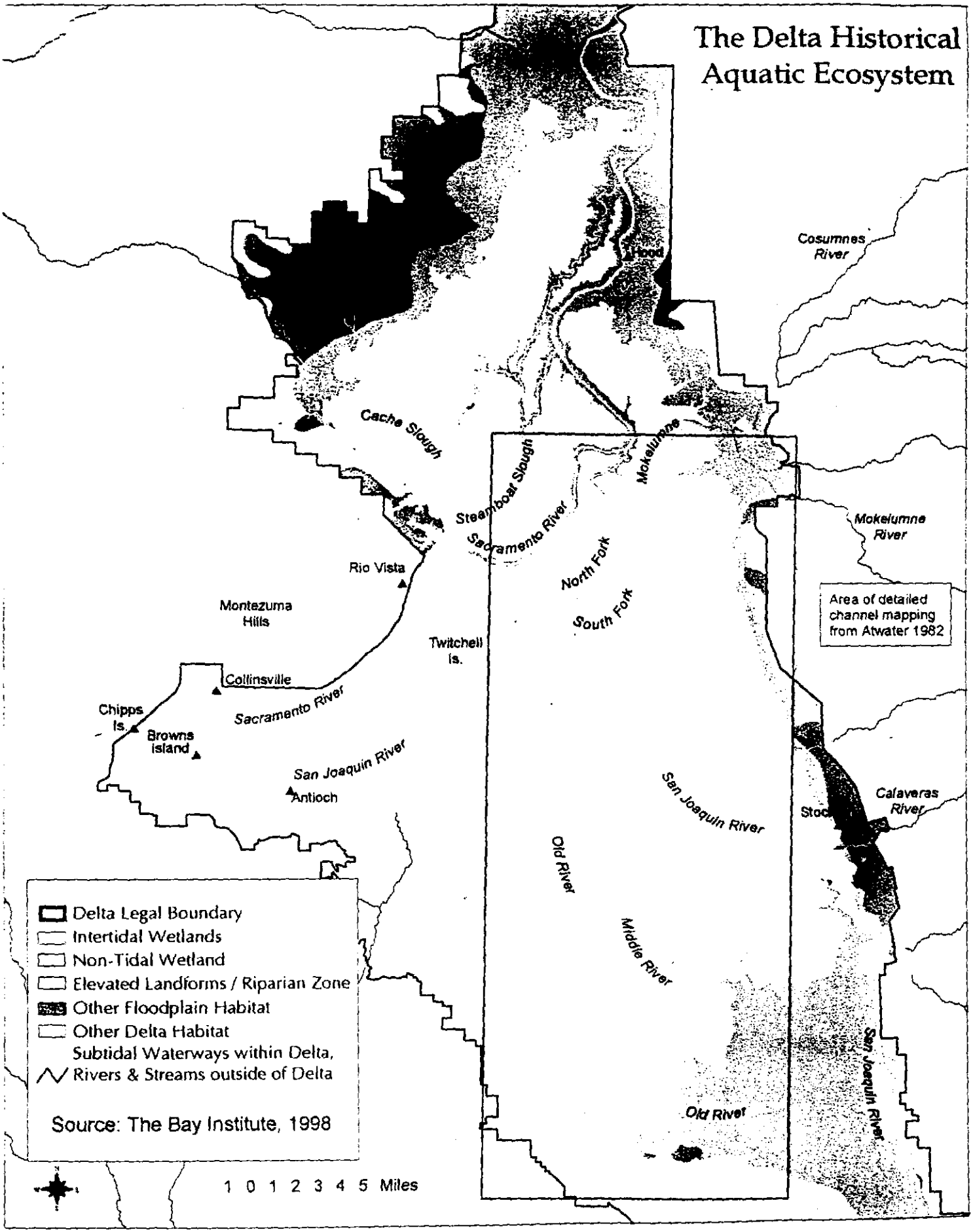
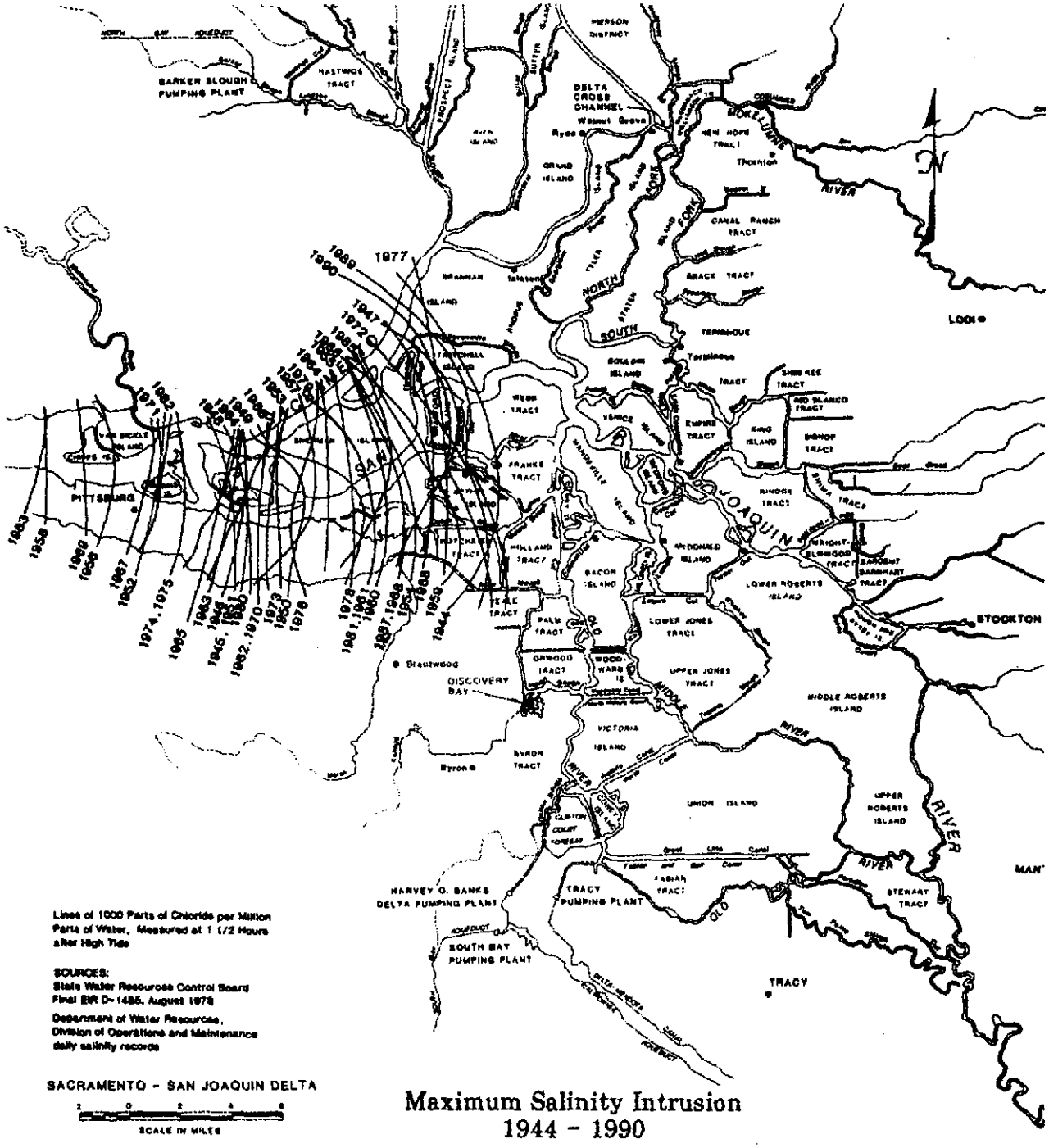

The Delta Historical Aquatic Ecosystem
Cosumnes River
Hood
Cache Slough
Steamboat Slough
Sacramento River
Mokelumne
Mokelumne River
Rio Vista
North Fork
South Fork
Montezuma Hills
Twitchell Is.
Area of detailed channel mapping from Atwater 1982
Collinsville
Chipps Is.
Browns Island
Sacramento River
San Joaquin River
Antioch
San Joaquin River
Calaveras River
Old River
Middle River
Old River
San Joaquin River
Delta Legal Boundary
Intertidal Wetlands
Non-Tidal Wetland
Elevated Landforms / Riparian Zone
Other Floodplain Habitat
Other Delta Habitat
Subtidal Waterways within Delta,
Rivers & Streams outside of Delta
Source: The Bay Institute, 1998
1 0 1 2 3 4 5 Miles

Figure 5. Maximum Salinity Intrusion 1944-1990



Source: Delta Atlas, Dept. of Water Resources

The draft ERPP also states that:

> Many leveed lands in the Bay and Delta have subsided and are too low to support shallow tidal perennial aquatic habitat, and thus cannot be readily restored. The greatest subsidence has occurred in the Central and West Delta Ecological Unit. A comprehensive long-term program is needed to reverse subsidence. Changes in land use management and use of suitable dredged materials or other "natural materials" should be implemented to restore land elevations to suitable ranges.

However, despite these clear statements of the potential for reuse in habitat restoration, the next sentence in the document dismisses subsidence reversal and the restoration of subsided Delta islands: "Restoration efforts should focus on those leveed lands that have not yet been subjected to severe subsidence."[10] Unfortunately, other than a few isolated statements, the CALFED document virtually ignores the potential for Delta reuse. This issue must be addressed soon, since CALFED is less than a year away from making a final decision regarding actions to be taken during the next seven years—CALFED's Stage 1.

During the past century and a half, the elimination of tule marsh vegetation, the redirection of sediment from upstream, farming practices, the nature of the Delta's peat soils, and the Delta's relentless winds have all combined to create one of the most dramatic land subsidence problems in the world. Much of the western and central Delta is highly subsided; many islands have subsided as much as fifteen feet (see figure 6). In some locations, subsidence has reached twenty-five feet. Some of these islands are still subsiding at a rate of one and a half inches per year.

Franks Tract provides a dramatic illustration of the restoration limits imposed by subsidence. Franks Tract was an island in the central Delta with a subsidence problem no worse than its neighboring islands. Then it failed so catastrophically in 1938 that it was never reconstructed. Wind, river flow, and tidal flow have limited sedimentation in Franks Tract so much that it remains, 60 years later, deep-water habitat. In fact, CALFED is now evaluating a proposal to place Delta dredged materials in Franks Tract to restore shallow-water and tidal-wetland habitat (see section IV).[11]

The subsidence problem has caused CALFED to direct its habitat restoration recommendations in the western and central Delta toward nontidal fresh emergent wetland habitat. The March 1998 draft ERPP called for ten thousand acres of nontidal freshwater marsh restoration in the western and central Delta. Of this amount, the document states, "Up to 75 percent of this acreage may be restored to tidal action after the appropriate land elevations are achieved through island accretion."[12]

...other than a few isolated statements, the CALFED document virtually ignores the potential for Delta reuse.

Freshwater nontidal habitat has important ecological values. However, this section of the ERPP clearly indicates that were it not for subsidence constraints, CALFED's draft recommendations would probably call for at least 7,500 acres of tidal marsh restoration in the western and central Delta.

The lack of adequate sediment for restoring habitat in the western and central Delta is a major constraint on habitat restoration. Figure 7 indicates tens of thousands of acres in this region where near-term habitat restoration will be impossible without implementing a subsidence-reversal strategy.

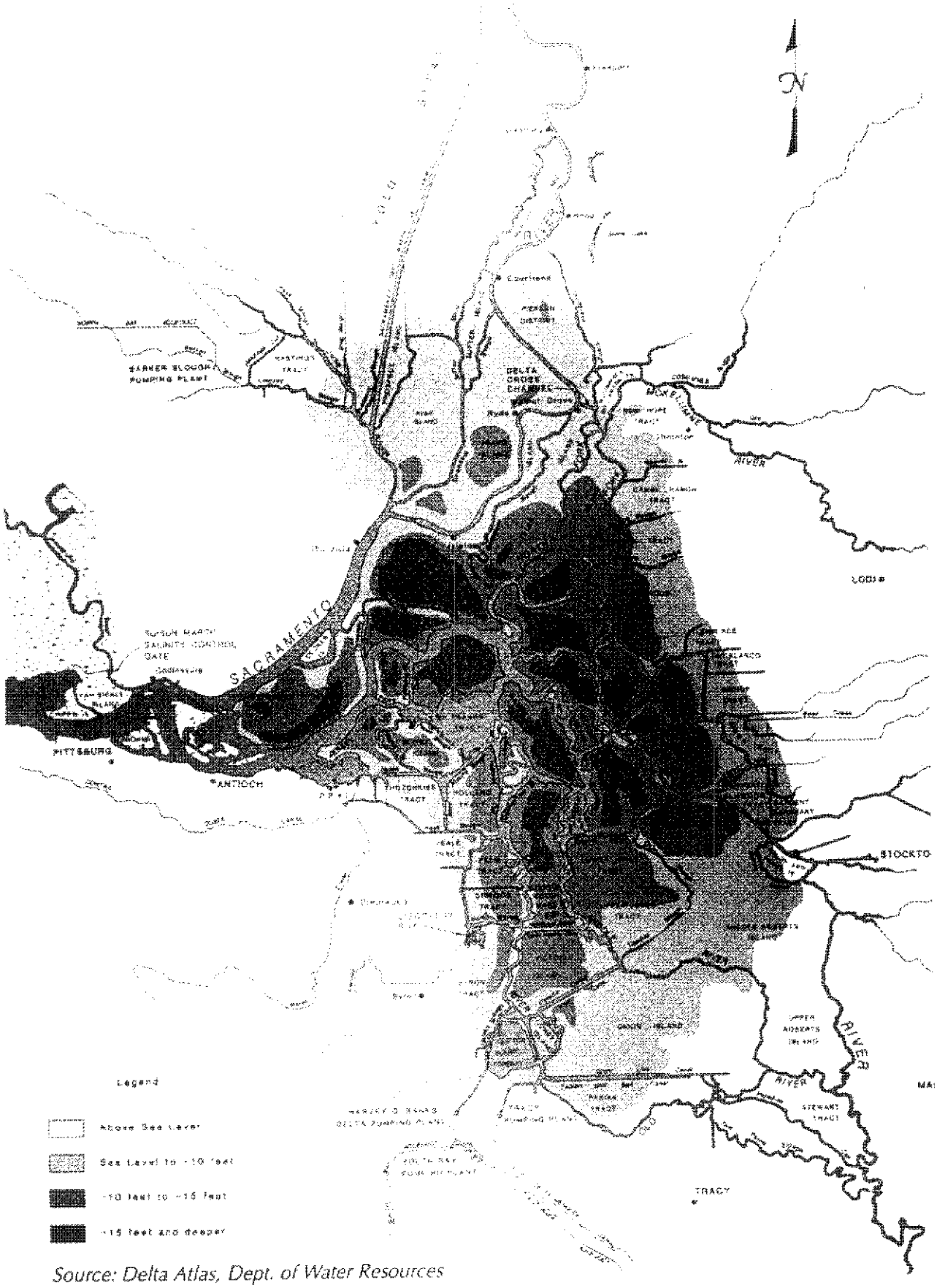
3. Land Ownership

Delta landowners have requested that CALFED focus its habitat restoration efforts on land that is already in public ownership. Without a strategy to reverse subsidence, the focus of restoration activities must be in parts of the Delta where most of the land is in private ownership. However, several islands in the western Delta are already predominantly in public ownership (see figure 4). Twitchell and Sherman Islands are largely owned by the State of California. Decker Island is partially owned by the State and Port of Sacramento. Restoration in this area, which could be made possible through the use of clean dredged materials from the Bay, could help reduce concerns that have been raised by local landowners. Although this is a political, not a biological, constraint, it could be a significant factor in broadening support for the final CALFED Ecosystem Restoration Program.

4. Subsidence Reversal Strategies

Using dredged materials to reverse subsidence or to create tidal-marsh habitat in formerly deep areas is not a new practice. The Corps of Engineers has been implementing these procedures in other parts of the country for at least twenty-five years.[13] There are three possible

Figure 6. Delta Subsidence: Land Below Sea Level



Source: Delta Atlas, Dept. of Water Resources

approaches to reversing subsidence on Delta islands to facilitate habitat restoration. The first is using in-Delta materials, discussed below. The second is sediment augmentation through vegetation management, or bioaccretion. Some experiments have found that growing tules on Delta islands can reverse subsidence. Growing tules may allow subsidence to be reversed by one to two inches per year.[14] Using this approach, however, it could take at least 60 years to raise highly subsided islands to tidal-marsh elevations. The third possible approach is to import sediment from the Bay or elsewhere. Rice straw from the Sacramento Valley may be another possible source of material.

Care must be taken in designing and implementing any program using Bay or Delta fill material to raise the elevation of Delta islands. Raising bottom elevations in these islands will require phasing to prevent additional subsidence and lateral spreading. Past experiences with raising Delta levees indicate that careful monitoring during phased filling for habitat purposes could prevent subsidence and instability and protect the integrity of levees. Levee projects have been found to accommodate filling rates of up to three feet per month without creating subsidence or stability problems.[15]

...organic Delta soils make poor levees, inorganic mud, such as that found in the Bay, is ideal for levee construction.

5. Potential Capacity for Dredged Material

The amount of material that could be used to restore tidal habitat on western and central Delta islands is enormous. To illustrate, much of Sherman Island, has subsided more than fifteen feet. At 10,000 acres, or fifteen square miles, if dredged material were used to raise the elevation of the entire island (an unlikely approach), each three feet of subsidence reversal would require an additional 48.4 mcy of material. CALFED staff has indicated that, were it not for cost, CALFED's demand for material for habitat restoration would be practically limitless.[16]

Levee Integrity

1. An Overview

Over 1,100 miles of Delta levees protect a fragile network of increasingly subsided islands (see figures 8 and 9). These islands, totaling more than 700,000 acres, support important farming activities, thousands of residents, and important wildlife habitat. These islands also preserve the integrity of the Delta as the heart of California's plumbing system. Because two-thirds of the fresh water in the state arrives as precipitation north of the Delta and two thirds of the state's demand for water lies south of it, the Delta is California's switching yard for water. Every year millions of acre-feet of water are diverted from the Delta by state and federal water projects.

One of CALFED's major areas of focus is on maintaining the integrity of Delta islands. The failure of levees and the resultant flooding of Delta islands (as a result of earthquakes, levee subsidence, or inadequate maintenance), increases the tidal prism of the Delta. The water rushing into a flooded Delta island must come either from the rivers upstream or from the Bay downstream. During floods, there may be adequate fresh water in the Delta to repel saltwater intrusion. However, during periods of low flow, a levee failure could draw significant amounts of salt water into the Delta. A catastrophic failure could threaten Delta residents, power and transportation infrastructure, farmland, wildlife habitat, and the state's two largest water projects.

Many Delta island levees have failed, for a variety of reasons, during the past 150 years. At least 30 Delta islands and tracts have flooded between 1930 and 1991, seven in 1986 alone (see figures 10, 11 and 12). In addition, as the amount of water diverted in the Delta has increased, and as subsidence has worsened, the risk of levee failure has increased. In 1986, DWR began a much more ambitious program to address Delta levee stability. Of the approximately 1,100 miles of levees in the Delta, CALFED has found that 600 miles must be upgraded to meet current standards.[17]

2. The Capacity for Material

CALFED has estimated that twenty-five mcy of material will be needed to strengthen and maintain Delta levees. It is possible that less material will be needed, since the CALFED levee program has not adequately considered that habitat restoration could take the form of removal or intentional breaching of levees. However, habitat restoration could also require additional sediment, as discussed above. In addition, alternatives such as setback levees, which would move levees and expand aquatic habitat, would require significant amounts of additional material.

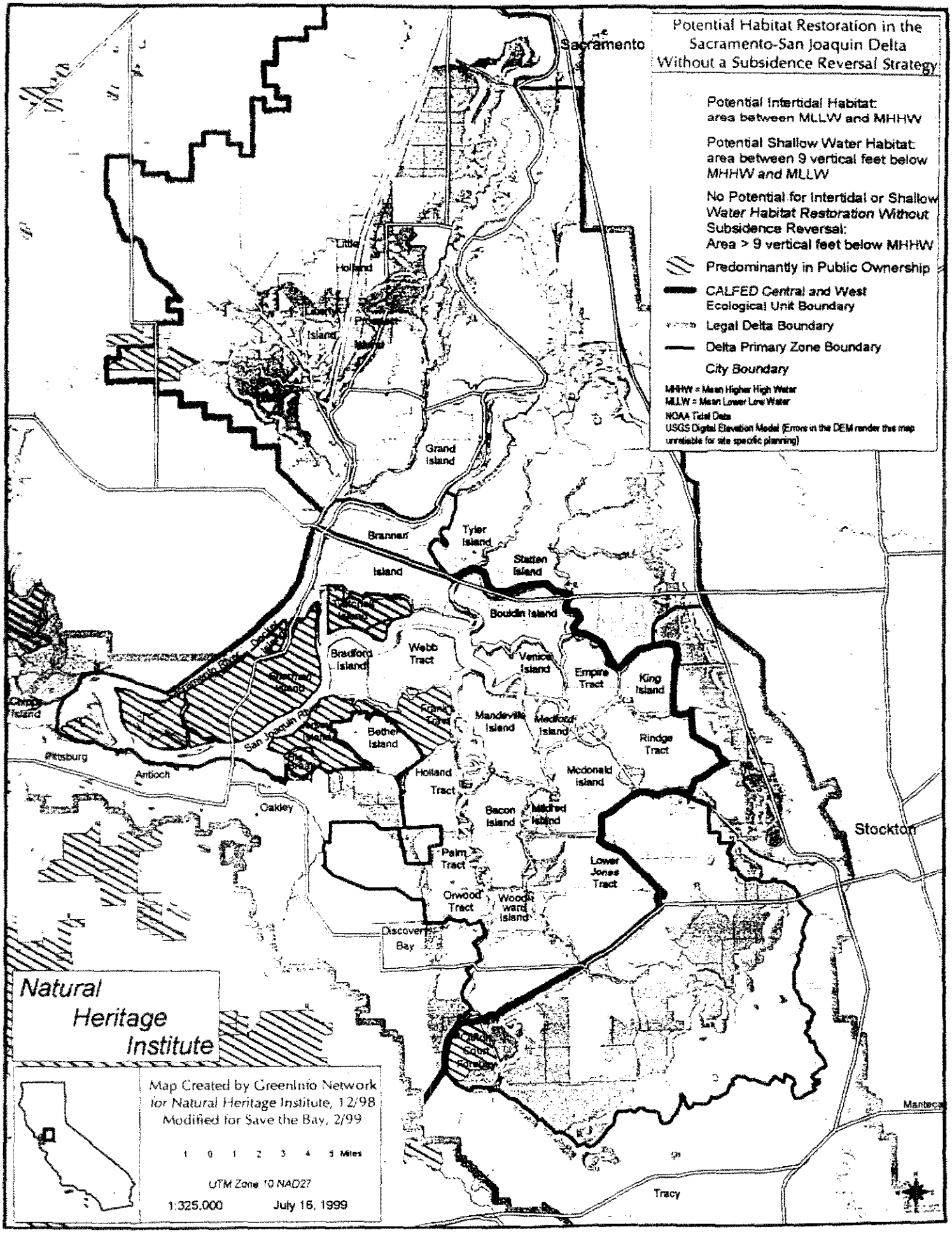
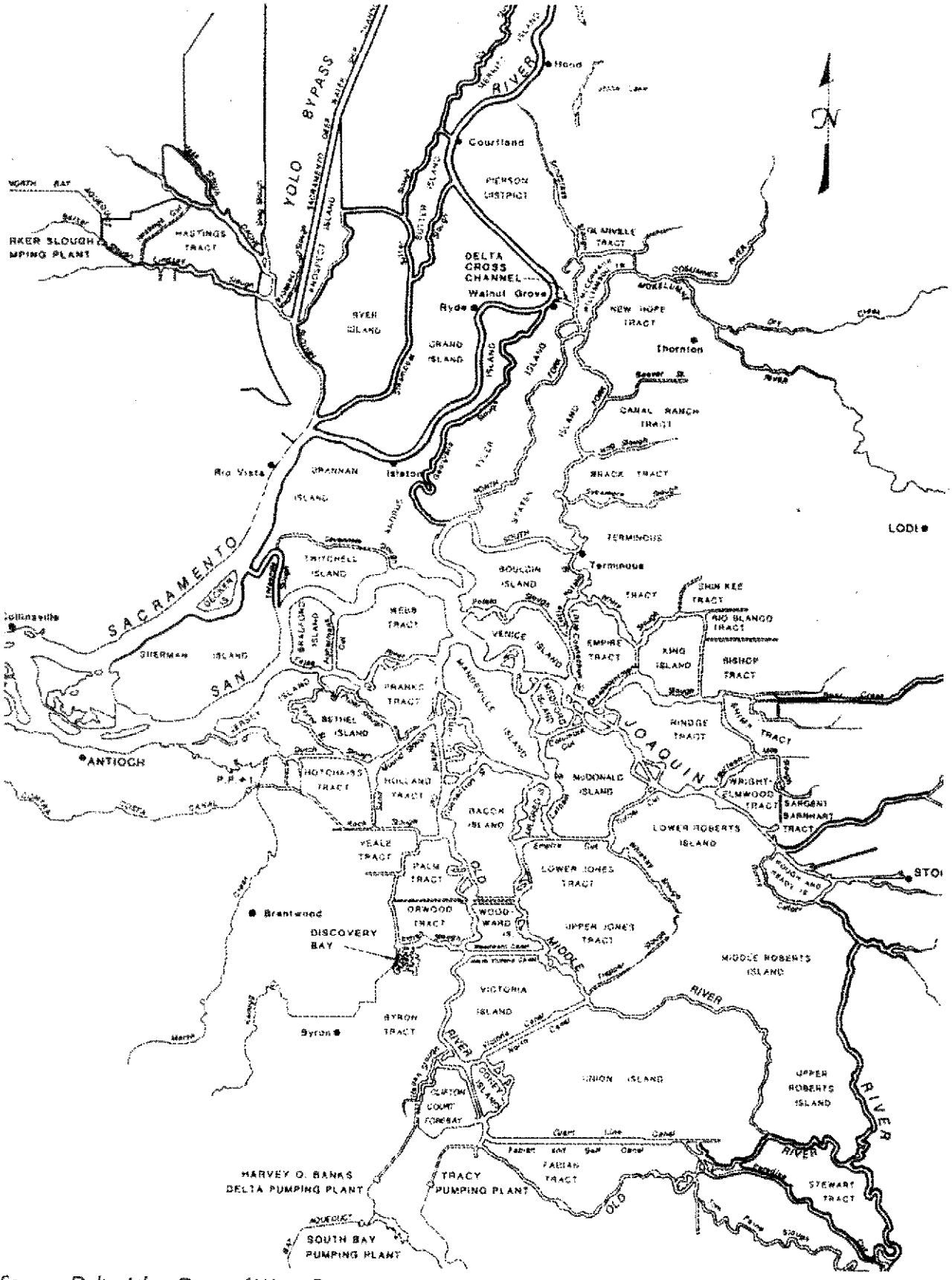
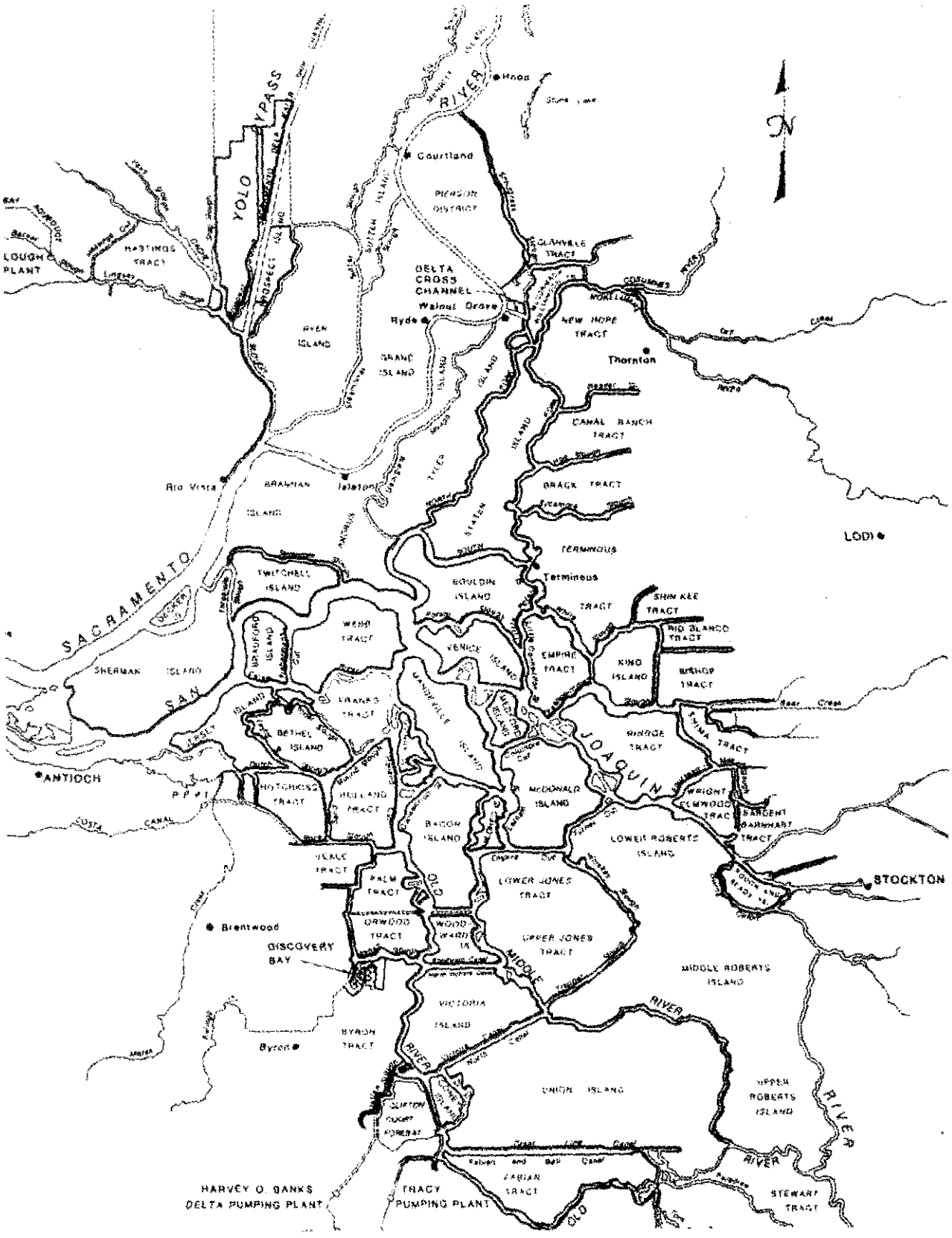

Potential Habitat Restoration in the Sacramento-San Joaquin Delta Without a Subsidence Reversal Strategy
Potential Intertidal Habitat: area between MLLW and MHHW
Potential Shallow Water Habitat: area between 9 vertical feet below MHHW and MLLW
No Potential for Intertidal or Shallow Water Habitat Restoration Without Subsidence Reversal: Area > 9 vertical feet below MHHW
Predominantly in Public Ownership
CALFED Central and West Ecological Unit Boundary
Legal Delta Boundary
Delta Primary Zone Boundary
City Boundary
MHHW = Mean Higher High Water
MLLW = Mean Lower Low Water
NOAA Tidal Data
USGS Digital Elevation Model (Errors in the DEM render this map unreliable for site specific planning)
Sacramento
Little Holland Island
Grand Island
Brannan Island
Tyler Island
Statten Island
Bouldin Island
Bradford Island
Webb Tract
Venice Island
Empire Tract
King Island
Mandeville Island
Medford Island
Rindge Tract
Bethel Island
Holland Tract
Mcdonald Island
Bacon Island
Palm Tract
Lower Jones Tract
Orwood Tract
Woodward Island
Discovery Bay
Pittsburg
Antioch
Oakley
Stockton
Manteca
Tracy
Natural Heritage Institute
Map Created by GreenInfo Network for Natural Heritage Institute, 12/98
Modified for Save the Bay, 2/99
1 0 1 2 3 4 5 Miles
UTM Zone 10 NAD27
1:325,000
July 15, 1999

Figure 8. Federal Flood Control Project Levees



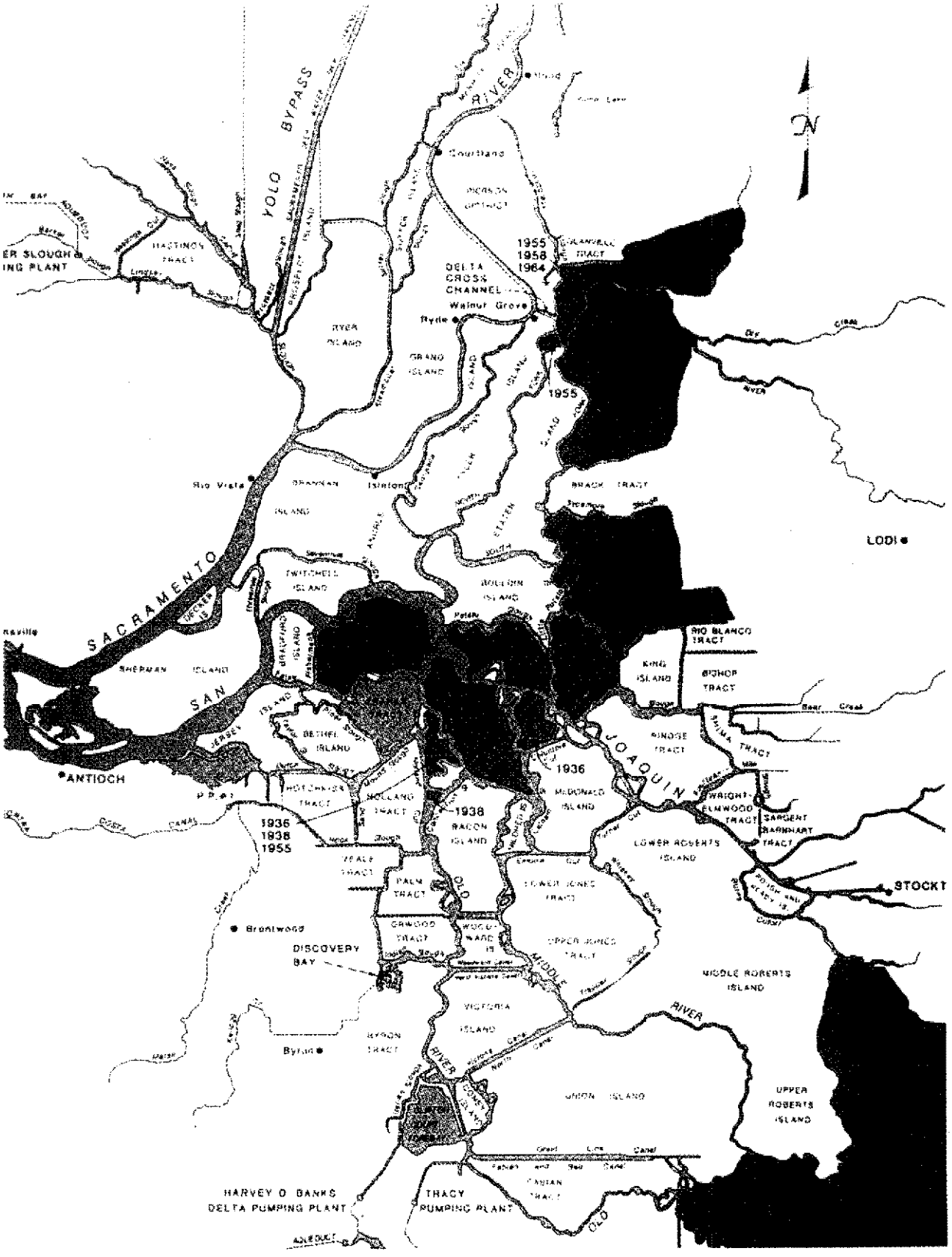
Source: Delta Atlas, Dept. of Water Resources

Figure 9: Local Flood Control Non-Project Levees



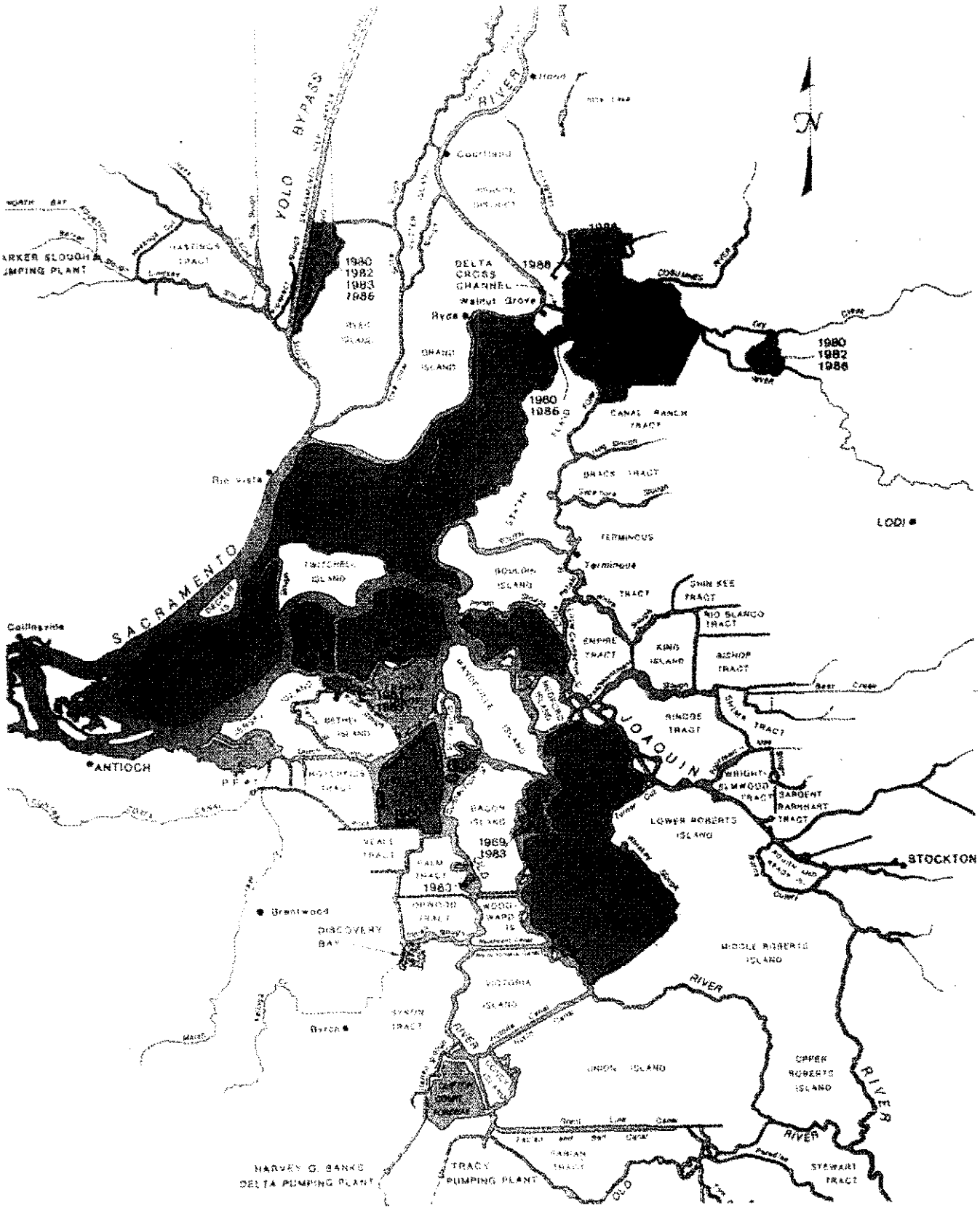
Source: Delta Atlas, Dept. of Water Resources

Figure 10. Delta Islands Flooded Since 1930



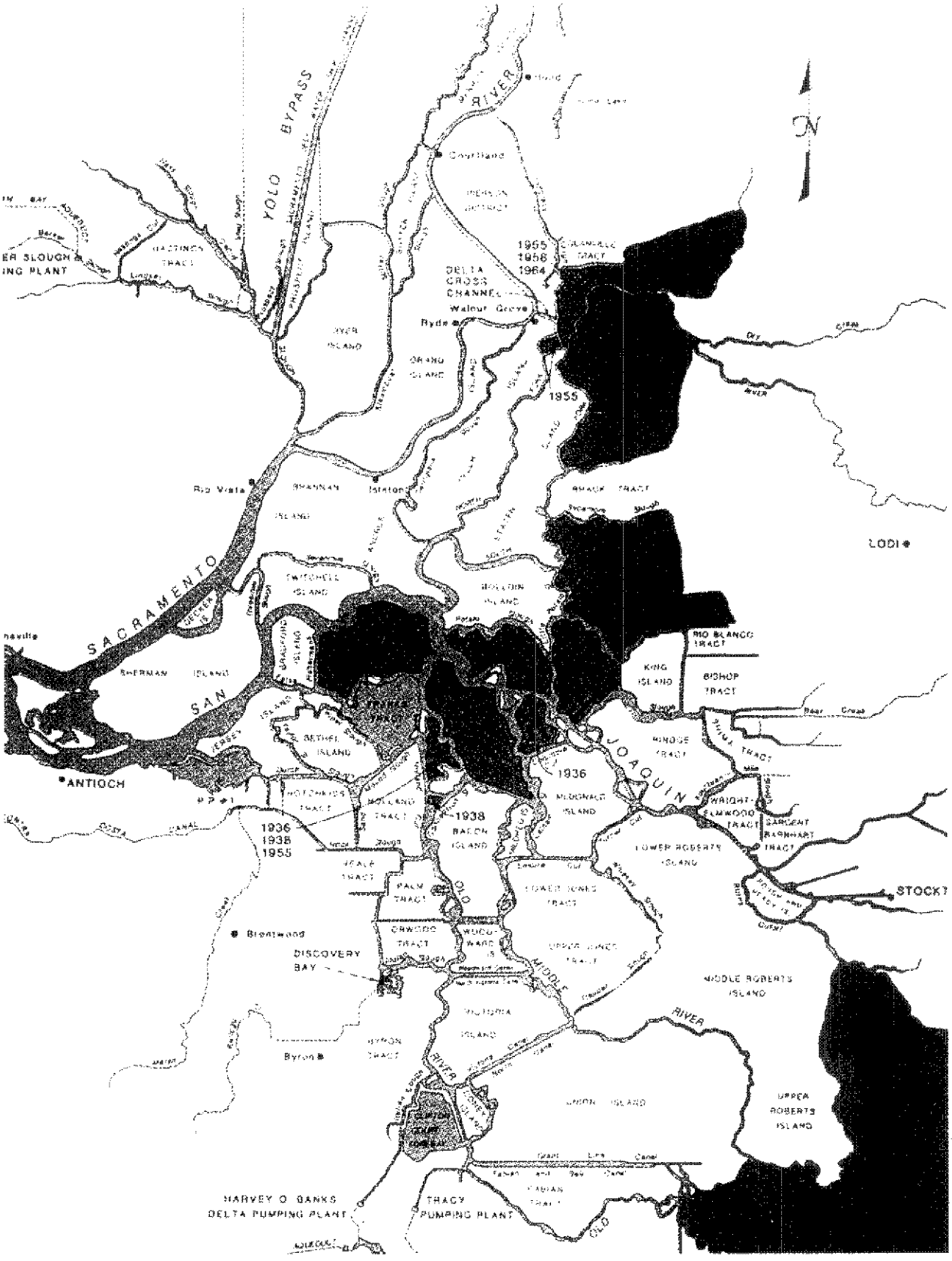
Source: Delta Atlas, Dept. of Water Resources

Figure 11. Delta Islands Flooded Since 1980



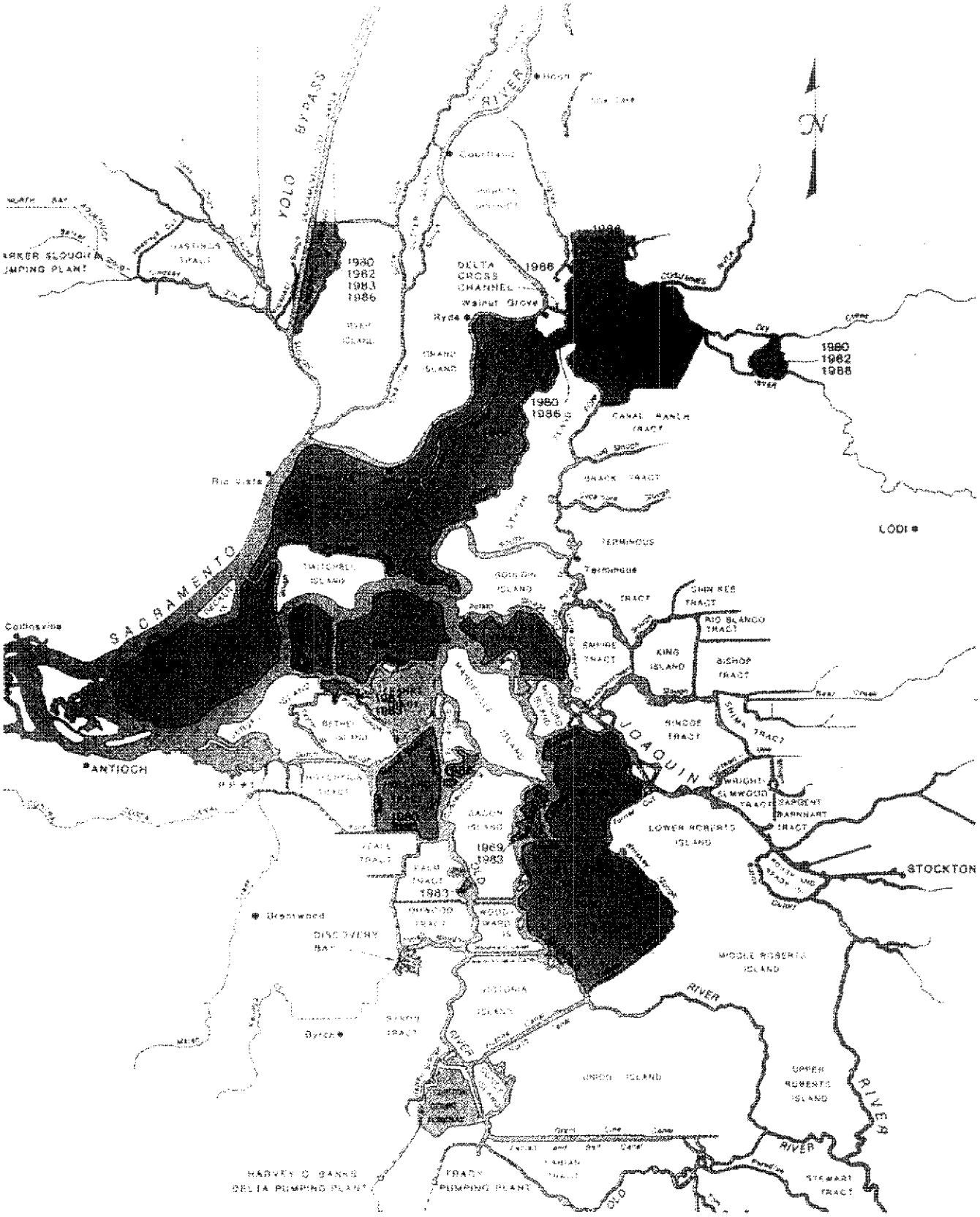
Source: Delta Atlas, Dept. of Water Resources

Figure 10. Delta Islands Flooded Since 1930



Source: Delta Atlas, Dept. of Water Resources

Figure 11. Delta Islands Flooded Since 1980



Source: Delta Atlas, Dept. of Water Resources

Figure 12. Historic Inundation of Delta Islands

Area Flooded	Acres	Years
Andrus Is.	7,200	1902,1907,1909, 1972
Bacon Is	5,546	1938
Bethel Is.	3,400	1907,1908, 1909,1911
Big Break Is.	2,200	1927
Bishop Tract	2,100	1904
Bouldin Is.	5,600	1904,1907, 1908,1909
Brack Tract	2,500	1904
Bradford Is.	2,000	1950,1983
Brannan Is.	7,500	1902,1904, 1907,1909,1972
Byron Tract	6,100	1907
Cliftoncourt Tract	3,100	1901,1907
Coney Is.	900	1907
Dead Horse Is.	200	1950,1955,1958, 1980,1986,1997
Donlon Is.	3,000	1937
Edgerly Is.	150	1983
Empire Tract	3,500	1950,1955
Fabian Tract	6,200	1901,1906
Fay Is.	100	1983
Franks Tract	3,300	1907,1936,1938
Glanville Is.	N/A	1986,1997
Grand Is.	N/A	1955
Grizzly Is.	8,000	1983,1998
Holland Tract	4,100	1980
Ida Is.	100	1950,1955
Jersey Is.	3,400	1900,1904,1907, 1909
Little Franks Tract	350	1981,1982,1983
Little Mandeville Is.	200	1980,1994
Lower Jones Tract	5,700	1907,1980
Lower Roberts Is.	10,300	1906
Mandeville Is.	5,000	1938
McCormack-Williamson Tract	1,500	1938,1950,1955 1958,1964,1986 1997
McDonald Is.	5,800	1982
McMullin Ranch	N/A	1997
Medford Is.	1,100	1936,1983
Middle Roberts Is.	500	1938
Mildred Is.	900	1965,1969,1983
New Hope Tract	2,000-9,500	1900,1904,1907, 1928,1950,1955, 1986
Palm TRAC	2,300	1907
Paradise Junction	N/A	1997
Pescadero	3,000	1938,1950,1997
Prospect Is.	1,100	1980,1981,1982, 1983,1986,1995, 1997
Quimby Is.	700	1936,1938,1950, 1955
RD17	4,500-5,800	1901,1911,1950
RD 1007	3,000	1925
Rhode Is.	100	1938
River Junction	1997	
Ryer Is.	11,600	1904,1907
Sgt. Barhart Tract.	1,100	1904,1907
Sherman Is.	10,000	1904,1906,1909, 1937,1969
Shima	2,394	1983
Shin Kee Tract	700	1938,1958,1965, 1986
Staten Is.	8,700	1904,1907
Stewart Tract	3,900	1938,1950,1997
Terminous Tract	5,000-10,000	1907,1958
Twitchell Is.	3,400	1906,1907,1908
Tyler Is.	8,700	1904,1907,1986
Union Is.	24,000	1906
Upper Jones Tract	6,200-5,700	1906,1980
Upper Roberts Tract	500	1938
Van Sickle	N/A	1983,1998
Venice Is.	3,000	1904,1906,1907, 909,1932,1938, 1950,1982
Victoria Is.	7,000	1901,1907
Walthall	N/A	1997
Webb Tract	5,200	1950,1980
Wetherbee Lake	N/A	1997

Source: Dept. of Water Resources, Flood Protection and GIS Branch

Salinity aside, Bay material is highly suitable for Delta levee construction. Whereas organic Delta soils make poor levees, inorganic mud, such as that found in the Bay, is ideal for levee construction. Bay sand could also be useful in reinforcing the backs of levees and in levee seepage control features such as drain blankets.[18]

In-Delta Sources

There are four potential sources for in-Delta material for use in habitat restoration and levee maintenance. The first is in-Delta dredging, which produces an estimated 100,00 to 200,000 mcy per year, only some of which are currently reused in the Delta.[19] Using this source alone, it would require eleven to twenty-two years to meet CALFED's levee maintenance goals, without any reuse for habitat restoration. The second source is commercially available aggregate, a highly expensive option. The third source is material that could be excavated from existing Delta islands. However, given the fact that much of the material in the Delta is unsuitable for levee construction, and given the ongoing subsidence problem, the usefulness of this approach is limited.

Finally, CALFED has funded DWR to evaluate the feasibility of constructing sediment traps in the Delta. The wetlands on Delta islands formerly functioned as an enormous trap for sediment flowing into the Estuary. Delta leveeing has eliminated these traps, directing sediments downstream into the Bay. DWR staff is considering the possibility of constructing an artificial sediment trap in the western Delta to capture sediment before it reaches the more saline portion of the Estuary. This material would be pumped onto an island to be used there or elsewhere for habitat and levee maintenance. This idea is still in the conceptual stages.

CALFED is working to determine how much total material could be produced cost-effectively by using these four approaches. What is clear is that the demand for material far outweighs what's available in the Delta.

IV. The Status of Delta Reuse

Demonstration projects using clean Bay materials to maintain Delta levees have produced encouraging results, showing no significant water quality impacts. Given the interest in Delta habitat restoration and the shortage of dredged material in the Delta, Bay dredged material may play a greater role in future Delta habitat restoration projects.

The concept of using Bay-dredged material in the Delta is not new. Prior to the Sonoma Baylands project, for example, the Port of Oakland sought approval to take material from its 42-foot deepening project to Twitchell Island. Failure to obtain necessary permits killed this project and alienated Delta stakeholders and the Central Valley Regional Water Quality Control Board. As mentioned above, using Bay material in the Delta has also been discussed in both the LTMS and in CALFED. This section briefly reviews the status of efforts to evaluate this concept in these two forums and discusses related recent, current, and proposed projects.

CALFED Planning

CALFED recently paid for staff at the Central Valley RWQCB to begin work on a general permit for Delta habitat restoration using material dredged in the Delta. CALFED staff is also interested in pilot programs to learn more about the potential of using Bay-dredged material in the Delta for habitat restoration. As indicated above, the draft EIS/EIR discusses the potential of reversing subsidence in the Delta using Bay material. However, this potential has not yet been factored into the calculation of Delta restoration goals or into the development of CALFED early-implementation habitat restoration projects. At the moment, the CALFED ecosystem program has not developed a clear approach to evaluate and, as appropriate, implement such reuse.[20] CALFED has funded some monitoring work to investigate progress toward the restoration of habitat in the Delta, both at sites that have received Delta dredged material and at sites that have not. CALFED has chosen not to fund additional work in this area.[21]

Although staff for the CALFED Levee Program have indicated an interest in Delta reuse of Bay dredged material, they have indicated that, as a result of concerns from the Central Valley RWQCB and the Corps of Engineers, this work has not moved forward.[22] Several contacts indicated that because of inadequate resources and competing priorities, the Central Valley RWQCB has not allocated adequate staff resources to this issue.

...the time appears to be right for a Delta habitat demonstration project using Bay dredged material.

LTMS, DWR, and Demonstration Projects.

In the past several years, the LTMS has moved from the concept to the reality of beneficial reuse. The Sonoma Baylands restoration project, using nearly three mcy of dredged material from the Port of Oakland to restore 322 acres of tidal marsh in San Pablo Bay, represented a major step. Work is now well under way to create a larger restoration project at Hamilton Field. Several other possible projects, including a private contained disposal and wetlands creation project called Montezuma Wetlands, are also under consideration. For the past decade, the Department of Water Resources has made a significant investment in Delta levee maintenance and in habitat restoration. That agency deserves much of the credit for developing demonstration projects and for providing answers to some of the questions regarding Delta reuse of Bay material.

1. Delta Levee Demonstration Projects

The LTMS has also taken several steps to evaluate the feasibility of Delta reuse of Bay material. Over the past ten years there have been four levee maintenance demonstration projects undertaken under the leadership of the Department of Water Resources and

LTMS agencies. The monitoring results from these projects have indicated no significant water-quality impacts.

- Sherman Island was the first island in the Delta to receive Bay dredged material for beneficial reuse. In 1990 the Department of Water Resources used 1,600 cy of dredged material from Suisun Slough to reinforce the levees on Sherman Island. Two years of monitoring required by the CVRWQCB indicated no soil contamination or adverse water-quality impacts.

- In 1992 Twitchell Island received 50,000 cy of Suisun Bay Channel-dredged material as a part of levee rehabilitation on that island. DWR monitoring on Twitchell Island has not indicated any significant water-quality impacts from increased salinity, although levee subsidence has been noted.[23] However, it is important to note that because the material used on Twitchell Island had been stockpiled on Simmons Island for several years, some of its salinity certainly leached out before it was used at Twitchell Island.

- The 1994 Jersey Island project was the most recent and largest Delta pilot project to date, receiving 80,000 cy of material dredged from Suisun Bay and New York Slough. The monitoring report was released in May 1997.[24] Despite the fact that this material was dredged high in the Estuary, it still contained an estimated 194,491 pounds of salt. The summary of monitoring results to date indicates that receiving water salt loadings did not appear to be significant and that water quality was at background levels. The report also stated that "due to an extremely wet rainy season and because of the low porosity and high permeability of sandy material, the salt impacts were relatively short term (only about one month)."

- Winter Island, which is just west of the legal boundary of the Delta, received 100,000 cy of Bay dredged material for levee restoration work in 1998. This project went so well that another 100,000 cy of Bay dredged material will be delivered to Winter Island in 1999.

2. Proposed Delta Habitat Restoration Projects Using Delta Dredged Material

Although there have been several levee pilot projects using Bay dredged material, this effort, as part of the DMRP, is the only step that the LTMS has undertaken to evaluate the potential of Delta reuse in habitat restoration. Below is a list of proposed Delta habitat projects that used or would use dredged material from the Delta. Although these projects have not addressed the issues related to the reuse of Bay material, they have demonstrated the value and feasibility of Delta habitat restoration.

- Staten Island project: In 1994, as part of a larger project to establish shaded riverine habitat, 25,000 cy of Delta dredged material was used to raise the elevation on the exterior side of the island to a level suitable for planting tules, cattails, willows, alders, and cottonwoods. In the future this site may be rehabilitated

Table 2 - Delta Levee Maintenance Projects Using Bay Dredged Material and Habitat Restoration Projects Using Delta Material.

Project Location	Year	Purpose	Material Source	Volume (CY)
Sherman Is.	1990	Levee	Suisun Bay	1,600
Twitchell Is.	1992	Levee	Suisun Bay	50,000
Jersey Is.	1994	Levee	Suisun Bay	80,000
Winter Is.	1998	Levee	Suisun Bay	100,000
Winter Is.	1999	Levee	Suisun Bay	100,000
Staten Is.	1994-N/A[29]	Habitat	Delta	25,000
Franks Tract	Proposed	Habitat	Delta	1,000,000
Bradford Is.	Proposed	Habitat	N/A	N/A
Sherman Is.	N/A	Habitat	Delta	25,000+
Twitchell Is.	1999	Habitat	Delta/Bay	N/A
Donlan Is.	1984	Habitat	Delta	525,000
Venice Cut Is.	1986	Habitat	Delta	604,500

using various techniques to reach a level that would support more woody vegetation.[25]

- Proposed Franks Tract Category III[26] Project: Franks Tract is a flooded island located in the central Delta. It is approximately 3,300 acres and is owned by the State of California and operated by the Department of Parks and Recreation. This proposed demonstration project, to be funded by CALFED, would use approximately one mcy of material to restore 42 acres of islands. This restored area would hopefully increase the fish and wildlife resources, provide effective wave barriers to help protect the levees of the adjacent islands, and expand recreational opportunities. If the demonstration project proves effective, the long-term plan is to restore 500 acres of the islands.

- Proposed Bradford Island project: DWR has investigated the opportunity to use dredged material to build up the northern half of Bradford Island. This project was deemed too expensive.[27]

- Sherman Island Category III project: The Sherman Island Berm Demonstration Project is a 2.2-acre island to be constructed in the San Joaquin River, near Sherman Island.[28] The island will be constructed on an unvegetated submerged sandy shoal using tubes of coir fabric that will be filled with 25,000 cy of a sand and slurry mixture. Once the perimeter is in place, the center area will be filled with soil and stabilized.

- Twitchell Island Category III project: The purpose of this $3.5 million project, slated to begin within the year, is to determine methods of reversing subsidence in the Delta. This project is funded jointly by the DWR and CALFED. In addition to growing rules to increase the organic composition of the island, a large quantity of additional sediment will be used. Where this sediment will come from has not yet been determined. It is possible that Bay dredged material will be used in part.[30]

- Donlan Island. In 1984, the Corps of Engineers used 525,000 cy of Delta dredged material from the Stockton ship channel to restore 58 acres of shallow-water habitat at Donlan Island, a flooded Delta island immediately downstream from Sherman Island.

- Venice Cut Island. In 1986, the Corps placed 604,500 cy of Delta dredged material in Venice Cut Island, another flooded Delta island, to create 23 acres of shallow-water habitat.

Given the encouraging results of the levee maintenance demonstration project using Bay dredged material, the interest in Delta habitat restoration, and the shortage of dredged material in the Delta, the time appears to be right for a Delta habitat demonstration project using Bay dredged material.

V. Salinity Concerns

Although salinity is currently an obstacle to the reuse of Bay dredged materials in the Delta, a variety of control strategies could be explored to reduce or mitigate salinity impacts.

Salinity is the major obstacle to the reuse of Bay dredged material in the Delta. Sediment from the Bay varies dramatically in type. In addition, the salinity gradient in the Estuary results in dramatic ranges in salinity in Bay sediments. However, all material dredged from the Bay retains some salt. Material reused in a pilot project on Jersey Island (discussed below) was found to range from " 10,000 to 17,000 milligrams per liter from Suisun Bay and 3,000 to 4,000 mg/l from New York Slough."[31] Material dredged lower in the Estuary has a correspondingly higher salinity level. In simple terms, if salinity in Bay muds ranged from 3,000 to 17,000 mg./l, then Delta reuse of one mcy of Bay material could result in the importation of 3,000 to 17,000 cy of salt.

How much salinity would be released in the Delta through levee maintenance and habitat restoration using Bay material is not clear. However, importing this saline material into the Delta raises concerns, because the Delta is already a salinity-impaired environment. The diversion of roughly half of the Estuary's natural inflow allows salt water to intrude into the Delta at certain times of the year, with deleterious impacts on the environment, Delta farming, and Delta export water quality. Reducing and managing this salinity intrusion is a major focus of the Bay-Delta Accord and the X2 standard discussed above.

Depending on the location of reuse in the Delta, salinity from Bay materials could also have a harmful effect on ongoing Delta agricultural practices. For years there has been controversy, particularly in the western and southern Delta, over the impacts of water project-caused salinity on agriculture. In fact, the Department of Water Resources purchase of western Delta islands has largely been driven by a desire to address these concerns.

The indiscriminate use of Bay dredged material in the Delta could increase salinity levels at times of the year when salinity standards control the operation of water projects, potentially requiring additional water releases from upstream reservoirs or reduced Delta exports to maintain required salinity levels. Such "losses" of water would be of great concern to water users who rely on Delta exports. Increases in delta salinity could also worsen drinking water quality for Delta exporters, particularly the Contra Costa Water District, which is the urban water district most reliant on Delta water.

Salinity could be a constraint on habitat restoration as well as on water quality. Highly saline material may or may not prove to be an appropriate substrate for the brackish to fresh-water vegetation that is needed to support healthy habitat in the Delta. A pilot Delta habitat restoration project using Bay material could reveal whether these impacts are significant.

Regulatory Constraints Regarding Salinity

1. Standard and Policy

Following the Bay-Delta Accord, the State Water Resources Control Board adopted water rights Decision 95-6, setting a revised salinity standard for the Estuary. When Decision 95-6 expired, it was replaced by Decision 98-9, which regulates both salinity and Delta exports. Requirements vary by year, type and actual conditions in the Delta. Setting this new standard required sixteen years of scientific research, litigation, federal legislation, and extensive stakeholder negotiations. Therefore, any action such as Delta reuse of Bay material that could complicate the implementation of this complex standard will be subject to close scrutiny.

The Central Valley Regional Water Quality Control Board staff has indicated that due to salinity concerns, the state's antidegradation policy prevents the large-scale importation of Bay dredged material to the Delta.

The state's antidegradation policy is contained in the Water Code:

> The Legislature further finds and declares that activities and factors which may affect the quality of the waters of the state shall be regulated to attain the highest water quality which is reasonable, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible.
>
> The Legislature further finds and declares that the health, safety and welfare of the people of the state requires that there be a statewide program for the control of the quality of all the waters of the state; that the state must be prepared to exercise its full power and jurisdiction to protect the quality of waters in the state from degradation.[32]

The Central Valley and San Francisco Regional Water Quality Control Boards have overlapping jurisdiction over the dredging and importation of material from the Bay to the Delta. The boundary separating the two agencies is just west of Sherman Island. The antidegradation policies of these two regional boards follow:

> Implementation of this policy to prevent or minimize surface and groundwater degradation is a high priority for the Board. In nearly all cases, preventing pollution before it happens is much more cost-effective than cleaning up pollution after it has occurred.[33]
>
> The "Statement of Policy with Respect to Maintaining High Quality of Waters in California," known as the Antidegradation Policy, provides conditions under which a change in water quality is allowable. A change must:
>
> - Be consistent with maximum benefit to the people of the state;
> - Not unreasonably affect present and anticipated beneficial uses of water; and
> - Not result in water quality less than that prescribed in water quality control plans or policies.[34]

2. Applying the Antidegradation Policy

In determining if the state's antidegradation policy prevents the reuse of dredged material from the Bay due to salinity concerns, several factors must be evaluated:

- How much material would be used?
- How much salinity would be contained in this material?
- How much salinity would be released, and when, if this material were used in the Delta?
- Could the release of this material violate standards in Decision 95-6?
- What impacts would the release of this salinity have on beneficial uses in the Estuary?
- Could these impacts be adequately mitigated?
- What public benefits would be derived from using these materials?

Potential salinity-control strategies are discussed below. However, two items should be noted here. First, the San Francisco Bay and Central Valley Regional Water Quality Control Boards have approved several Delta levee pilot projects (see table 2) that used dredged material from the Bay. In approving these projects and complying with the state's antidegradation policy, these Boards found that impacts from the projects would be minimal, that applicable salinity standards would not be violated, and that using this material would provide significant public benefits.

Second, a narrow interpretation of antidegradation could prohibit all tidal restoration in the Delta. Any restoration of diked islands, particularly in the western and central Delta would increase the tidal prism of the Delta and could increase the intrusion of salt water during times of low Delta outflow. Such a blanket prohibition of tidal-marsh restoration is clearly not in the public interest. To prevent this nonsensical outcome, the state and regional boards must consider the public benefits of restoration. These include ecosystem and fisheries benefits, water-quality filtration benefits provided by restored wetlands, and the prevention of catastrophic failure of Delta levees and the degradation of water quality that would ensue. In the case of much of the Delta, obtaining these benefits will only be possible by using material dredged from the Bay.

This review of the state's antidegradation policy and demonstration projects approved to date, reveals that there is no absolute prohibition regarding the reuse of Bay dredged material in the Delta for habitat restoration or levee maintenance. This review further suggests that a thoughtful course of investigation could allow the state and regional boards to weigh the environmental costs and benefits of such reuse.

Possible Salinity Control Strategies

One goal of this effort is to determine if potential control strategies exist that would reduce or mitigate salinity impacts caused by the importation of Bay dredged material to the Delta. This investigation has revealed several possible approaches:

1. *Project Location.*

One method of reducing potential salinity impacts is to locate a Delta reuse project in the western Delta, closer to the Bay, in a region of higher salinity and farther from the state and federal water projects in the southern Delta.

2. *Salinity Reduction*

Several strategies may be available to reduce the salinity of material taken to the Delta. The first would be to focus on Delta reuse of material dredged in the upper reach of the Bay. As indicated above, material dredged higher in the Bay system contains less salinity than material dredged in the central Bay.[35] An additional strategy could be to reuse sand, which retains less water, and therefore less salt, than Bay mud. On the other hand, given the impervious nature of Bay muds, it is possible that much of the their salinity would be sequestered in the Delta, as long as reuse sites were designed not be dispersive. Additional investigation into this issue will be required.

Levine-Fricke has proposed using a portion of their project site to "wash" material from the Bay to reduce salinity. If the project is approved, that material may be available for use in Delta habitat restoration or levee maintenance.

There are two alternate methods of placing material at sites in the Delta. The first is to use a clamshell crane. The second is to slurry dredged material with water and pump it onto Delta islands. Whereas the latter strategy would result in a greater release of saline material, placing material by clamshell would reduce salinity discharges.

3. *Capping*

Capping provides another potential strategy to reduce the release of salinity from Bay dredged material reused in the Delta. Given the degree of subsidence in islands in the western and central Delta, it may be possible to place Bay dredged materials in the bottom of these islands and to cover them with low-salinity material. This low-salinity material could be provided from in-Delta sources, as discussed previously, or from implementing the salinity-reduction strategies described above.

The Delta levee program itself could provide a source of capping material. The construction of levees on Delta peat soils can lead to dramatic subsidence, caused by compaction and lateral movement. For example, when DWR constructed a setback levee on virgin peat soils on Twitchell Island, an initial placement of four feet of fill led to four feet of compaction.[36] To reduce the subsidence of Delta levees, engineers have occasionally excavated peat spoils to replace them with material less susceptible to compaction and lateral movement. The Contra Costa Water District, for example, relocated

Figure 13. Delta Tidal Marsh Restoration Using Capped Bay Dredged Material

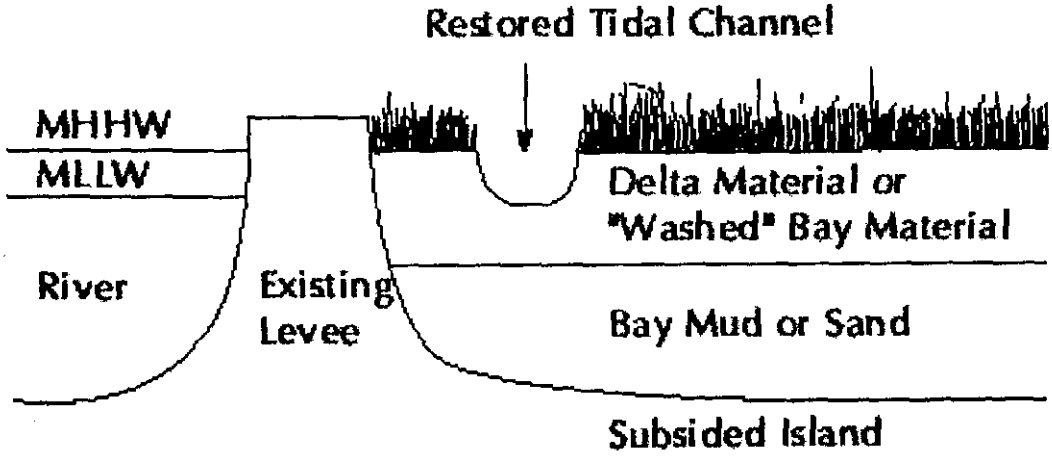
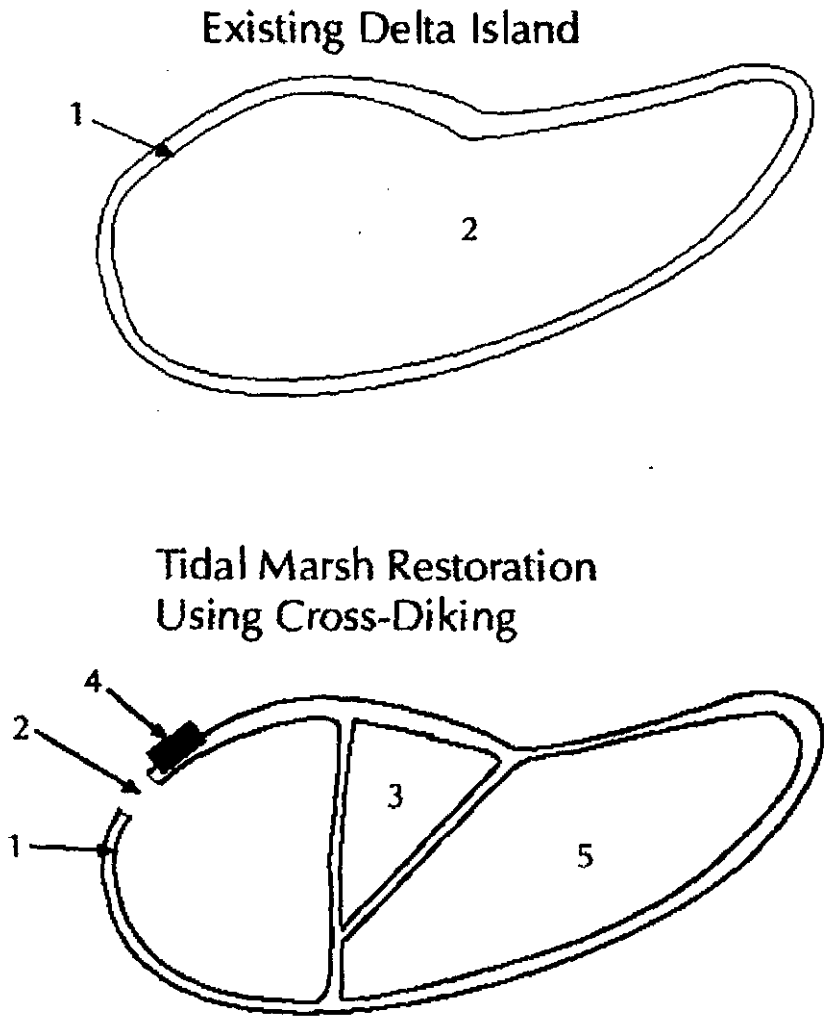


Figure 14. Tidal Marsh Restoration Using Cross-Diking and a Holding Pond



approximately 150,000 cy of peat soils as part of a levee project. As a part of another levee project, eight to ten feet of peat soils were excavated.[37] If such excavation were performed as part of a larger levee program, these peat soils could be used as capping material and as substrate for wetland vegetation.

Capping could allow Delta island levees to be breached, restoring tidal action while reducing the release of salinity (see figure 13). Special attention should be paid to the design of such a project to prevent material from being released into the environment through new slough channels in the restored marsh or through the levee breaches. In addition, the placement of heavy material on peat soils must be carefully planned to prevent additional subsidence or the undermining and failure of perimeter levees, since such failures could release additional saline material into the environment.

Seepage through levees could also release salinity from a capped Delta island. However, seepage through well-constructed levees in the other direction—from the rivers to the interior of Delta islands—is relatively small.

Capping contaminated materials in the aquatic environment has been attempted in different parts of the country, with mixed results. However, no examples could be found of the capping of saline material in a fresh or brackish water environment.

Capping may not address all potential salinity pathways, since salinity could also move through the Delta's high groundwater table. Additional investigation is required to determine the effectiveness of capping as a salinity-control strategy.

4. Timing of Disposal and Release of Saline Runoff

There are three possible strategies to time the release of saline discharges in the Delta to reduce salinity impacts.

First, during high freshwater outflow events, salinity in the Delta is dramatically reduced. If Bay material could be placed in the Delta at such times, it could significantly mitigate short-term salinity impacts. It may also

be possible to build mud—or plastic-lined holding ponds as a component of a restoration site to hold saline runoff during placement in Delta islands (see figure 14). This saline water could be held on site and released during times of high outflow. Some Delta islands have soils that are more suitable to serving as the foundation for the cross dikes that would be required to implement this strategy.

Second, saline water could be discharged during the ebb tide. In the western Delta, ebb tides would rapidly carry saline water into Suisun Bay, where it would be diluted, reducing potential the effects of salinity in the Delta.

Third, during high-flow winter outflow events, when salinity is reduced, it may be possible to flood Delta reuse cells, releasing salinity in Bay material in those facilities. At these times, salinity could be be washed from the surface of Bay muds and then discharged.

5. Selective Levee Application

The release of salinity could also be reduced through using Bay dredged materials on the top and on the inboard side of levees. This Delta salinity control strategy is discussed in the LTMS Final EIS/EIR. Material applied in these areas is not subject to irrigation or tidal action. Salinity would most likely be released from these areas during storms. There is a high probability that such storms would correspond to a high outflow event, when salinity is reduced. It may also be possible to adjust the operations of drainage pumps in Delta islands, which use Bay dredged material to release saline runoff during high outflow events.[58]

6. Open Water Disposal

Some of the above approaches require the rehandling of dredged material-pumping, washing, placing material with clamshells, and so on. However, if approaches can be found that control salinity and other impacts, material from the Bay could be placed in the Delta without rehandling. These approaches could allow barges carrying Bay material to "bottom-dump" to raise the elevation of existing deep-water habitat (a CALFED goal). It could also allow existing Delta islands to be partially or entirely flooded, allowing barges to enter and bottom dump material directly inside these islands. If such open-water disposal proves possible, it could significantly reduce the cost of restoration. Such open-water disposal has been done with Delta material at Donlan Island and is being contemplated for use at Franks Tract.

VI. Other Environmental Issues

Projects using Bay dredged materials in the Delta must be carefully designed to avoid or fully mitigate adverse effects on Delta natural resources.

In addition to the salinity issues discussed above, Delta reuse raises other potential environmental concerns, some of which will be discussed in this section.

Air Quality

The barging of material from the Bay to the Delta could have effects on air quality, in comparison with the disposal of this material at sites nearer to the central Bay. There are two primary ways in which this conceptual design could have air-quality impacts: transportation and dust.

Transportation

Several activities during the construction and operation of a Delta reuse project could have adverse air-quality impacts. These include site preparation, transportation, material placement, and rehandling. However, the primary cause of adverse effects on air quality would be from the diesel exhaust generated during the transportation of dredged material to the site (see figure 15). The LTMS EIS/R summarizes potential impacts on habitat restoration and levee maintenance from pollutants, including ozone, nitrogen dioxide, carbon monoxide, sulfur dioxide, and PM10.[39] Of these, ozone impacts present the greatest concern, since the Bay Area is out of compliance with the ozone standard. The remaining air-quality impacts all appear to be within regulatory requirements. The LTMS environmental document also concludes that the air-quality impacts of using dredged material for habitat restoration and levee maintenance would be insignificant.[40]

The effects of moving 5.2 mcy of dredged material from the Port of Oakland to the Montezuma Wetlands was also studied in the -50 ft. Dredge Project EIS/R.[41] Material would be removed from the inner and outer harbors using two clamshell dredges, loaded onto 5,000 cy scows, and towed by tug nearly to the Delta. Emissions from the dredges, tugboats, tender boats, and survey boats were all considered. The conclusion was that emissions from these temporary construction activities would cause an adverse, but not significant, air-quality impact under the BAAQMD CEQA Guidelines.

It is worth noting that transporting material to the Delta could result in lower emissions than disposal at the deep-ocean disposal site, which is located 50 miles from San Francisco. Average transport distance to the ocean site would be 71 nautical miles, significantly greater than distances to the Delta.[42] However, existing air quality in the Sacramento Metropolitan Air Quality Management District and the San Joaquin Valley United Air Pollution Control District is substantially poorer than that at the ocean site. In addition, the Clean Air Act only regulates air-quality discharges within three miles of the shoreline. Thus, most ocean disposal air discharges are sub-

Figure 15. Tug and Scow *Dept. of Water Resources*

ject to less stringent regulatory requirements. Moving air-quality discharges from one air management district to another (that is, from the Bay to the Delta) could raise concerns. Finally, EPA staff has indicated that it could issue new regulations in late 1999 that will affect marine engines.[43]

Dust

As dredged material dries there is a potential for dust to become airborne and to disperse to surrounding areas. Windblown dust, particularly PM10, can raise significant air-quality issues. However, the LTMS EIS indicates that potential mitigation measures should be adequate to control these impacts from levee maintenance and habitat restoration.[44] It is worth noting that the habitat restoration site could, when completed, reduce the amount of windblown dust generated. These air-quality concerns do not appear to threaten the feasibility of this approach.[45]

Water Quality

Delta reuse of Bay dredged materials could raise concerns about water-quality other than salinity. Two potential additional issues are the release of metals and pH impacts.

Metals

Moving dredged material from San Francisco Bay to a Delta upland reuse site raises concerns about the possible release of metals into the new environment. Two environmental changes, from saline to freshwater and from anaerobic to aerobic, are discussed below.

Moving material from a saline to a freshwater environment should pose no real threat for the release of metals. In fact, changing the environment of the materials in this way should actually reduce the likelihood of metals being released into the new environment.[46]

Moving the material from an anaerobic to an aerobic environment, where the dredged sediment is allowed to dry, can result in the oxidization of the material. This could reduce the ability of sulfides to bind metals, possibly increasing the bioavailability of metals in dredged materials. Reintroducing tidal water during the drying process could help to maintain anaerobic conditions, particularly prior to tidal restoration. The Sonoma Baylands restoration project was maintained in a saturated state to reduce the risk of metal bioavailability.

Given that material in the habitat restoration unit could be maintained in an anaerobic environment once the levee is breached, this may be a greater issue for the rehandling unit.[48] In the rehandling unit, the use of tidal waters to maintain an anaerobic condition might be dovetailed with tidal flushing as part of a salinity-control strategy.

Recent studies have shown that drying material for reuse in an upland or wetland site does not necessarily promote the release of contaminants or their bioavailability. In addition, the RWQCB sediment-screening guidelines are designed to provide safeguards against the placement of dredged material where it could pose a threat to the environment through the release of contaminants. Restricting Delta reuse to clean materials—material suitable for unconfined aquatic disposal—would further reduce the risk of metals-related water quality impacts.

pH

Sediment drying could also increase the acidity (lower the pH) of the sediment, potentially retarding plant growth. Such effects could slow the colonization of the site and interfere with efforts to create habitats. Some dry dredged materials support luxuriant vegetation, suggesting that sediment drying may not always be a concern. This potential problem could also be alleviated by maintaining the material in a saturated state, as discussed above, or by treating the material with a buffering agent, such as lime, to raise the pH.

The negative effect of a lowered pH on plant growth would also be reduced by the fact that the surface of the dried dredged material will not be the growing substrate for vegetation once the habitat restoration unit is restored to tidal action.[49] Instead, imported substrate (see section VII) or sediment provided by natural processes will likely serve as the vegetation substrate. Finally, the initial and final stages of filling the habitat restoration site could be managed differently to reduce potential pH issues (that is, the initial phases could be dried more aggressively and capped with subsequent material that would be kept in a more saturated condition).

Delta Fish, Wildlife, and Habitat

The Delta is essentially a freshwater system linked to the San Francisco Estuary by the narrow physical constriction of the Sacramento and San Joaquin Rivers. It is considered the ecological hub of the Central Valley, pro-

viding a habitat for many species of fish, birds, mammals, and plants.[50] Projects to use Bay dredged material in the Delta must be carefully designed to avoid or fully mitigate adverse effects on Delta natural resources.

Breakdown by Habitat Type

The Delta is approximately 679,000 acres. Delta land is broken down as follows: agricultural land covers approximately 531,000 acres (78 percent of the Delta); channels and open waters cover approximately 53,000 acres (8 percent); upland habitat covers approximately 44,000 acres (6 percent); urban habitat covers approximately 32,000 acres (5 percent); freshwater marsh habitat covers approximately 12,000 acres—11,000 acres tidal and 1,000 acres nontidal-(2 percent); and riparian habitat covers approximately 7,000 acres (1 percent).[51] The most likely significant habitat impact from a Delta reuse project is the elimination of jurisdictional nontidal wetlands. These effects could be reduced through site selection and on-site mitigation as a part of a habitat restoration program.

Plants

The dominant plant life in Delta freshwater tidal marshes are tules, bulrushes, reeds, and cattails. Deciduous trees and shrubs dominate the riparian forests of the Delta. Several plant species of concern grow on the Delta.[52]

Fish

Resident fish species include Delta smelt, longfin smelt, and Sacramento splittail. Native anadromous fish species include steelhead, four different runs of Chinook salmon, and two species of sturgeon.

All Central Valley salmonids, salmon, and steelhead must find their way through the Delta to spawn in upstream riverbeds. Recent salmon and steelhead runs in the Central Valley have been averaging 272,000 and 35,000 adult fish, respectively. The most abundant species in the Delta have all been introduced—the threadfin shad, the carp, the white catfish, the inland silversides, and the striped bass.

Vertebrates

There are 300 species, native and introduced, of amphibians, reptiles, birds, and mammals in the Delta. Forty native species are listed as species of concern. Ten are designated as state or federal threatened or endangered species.[53]

The Delta was once an important waterfowl nesting location. Today, with 95 percent of the marsh converted to agriculture, the number of waterfowl nesting in the Delta has dwindled. At the same time, the agricultural lands have become an important location for wintering waterfowl, supporting 10 percent of the entire state's overwintering population. These lands are particularly valuable to geese, swans, and ducks. Occasionally, 75 percent of the Tundra swans in the Pacific Flyway are found in the Delta. In addition, the Aleutian Canada goose, a state and federal endangered species, uses the Delta as a stopover when it is en route to its main wintering grounds in the San Joaquin Valley.[54]

The Delta is also an important wintering ground for the greater sandhill crane. And the riparian forests of the Delta, adjacent to native grasslands, are the breeding grounds for the Swainson's hawk, a state-listed threatened raptor species.

The majority of Delta amphibians and reptiles are dependent on marsh, riparian, and small pond and pool habitats.[55] The loss of such habitats over the years has been devastating to native amphibian species such as the California tiger salamander and the western spadefoot toad. The giant garter snake, found in the marsh and riparian vegetation of the Delta, is a state-listed threatened species.

The dominant species of mammals in the Delta are those that can tolerate being in the proximity of human populations. These include such land mammals as the skunk, raccoon, opossum, and ground squirrel. Aquatic mammals include beaver, muskrat, mink, and river otter.

Potential site-specific impacts from the conceptual design included in this report are discussed in section VII.

VII. Conceptual Delta Reuse Project

Habitat restoration on Sherman Island, at the confluence of the San Joaquin and Sacramento Rivers, would provide significant benefits to Delta smelt, salmon, steelhead and striped bass, especially during critical drought years.

This section presents a conceptual design for a Delta reuse project using clean Bay dredged material. This design includes very preliminary cost estimates and a preliminary discussion of financing. Finally, this section discusses the assumptions upon which the conceptual design is based and alternative approaches that may be worth further evaluation.

To provide a context for the evaluation of this conceptual design, this project is compared with the Hamilton Field reuse project. Save The Bay strongly supports the Hamilton Field reuse project, and we do not offer this project as an alternative to it. Rather, we offer this comparison to the widely supported Hamilton Field project to assist in the evaluation of the feasibility of Delta reuse. To this end, we have designed this project to be roughly comparable in scale to Hamilton Field and to handle only clean Bay dredged material.

Given the extent of subsidence on Sherman Island, habitat restoration is not possible in the near future without the importation of sediment.

Conceptual Design

This proposed project is located on the southwest end of Sherman Island, in the western Delta (see Figures 16 and 17). Sherman Island is a large island, of 9,937 acres, located at the confluence of the Sacramento and San Joaquin Rivers. It is located two miles northwest of the city of Antioch, across the San Joaquin River. The majority of the island is at elevations -ten to -fifteen NGVD. The Department of Water Resources owns virtually the entire island.

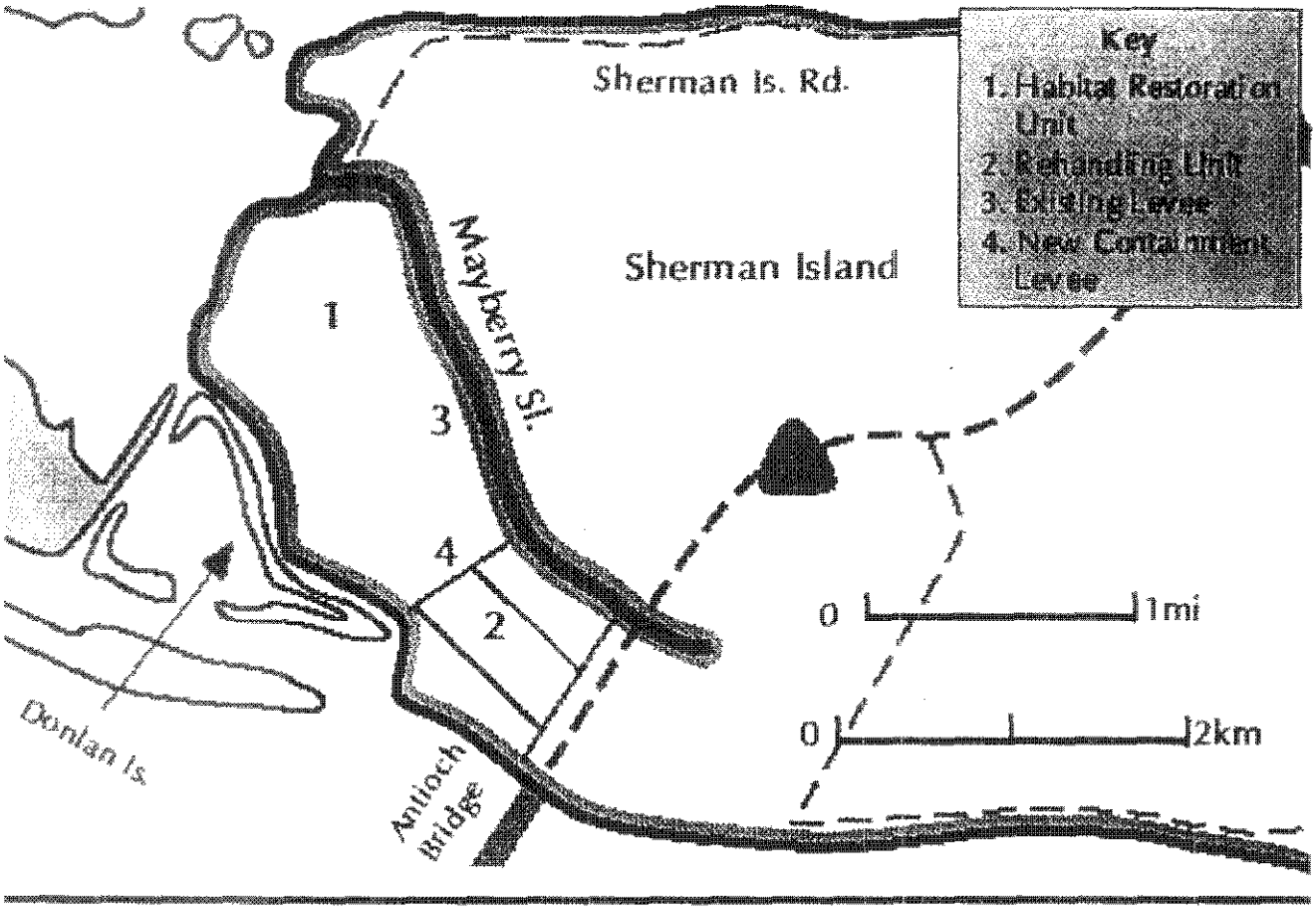
The conceptual design is a joint-purpose project, including both a 300-acre rehandling site for levee maintenance material, and a 1,200-acre habitat restoration site. There are several advantages to the joint-project design:

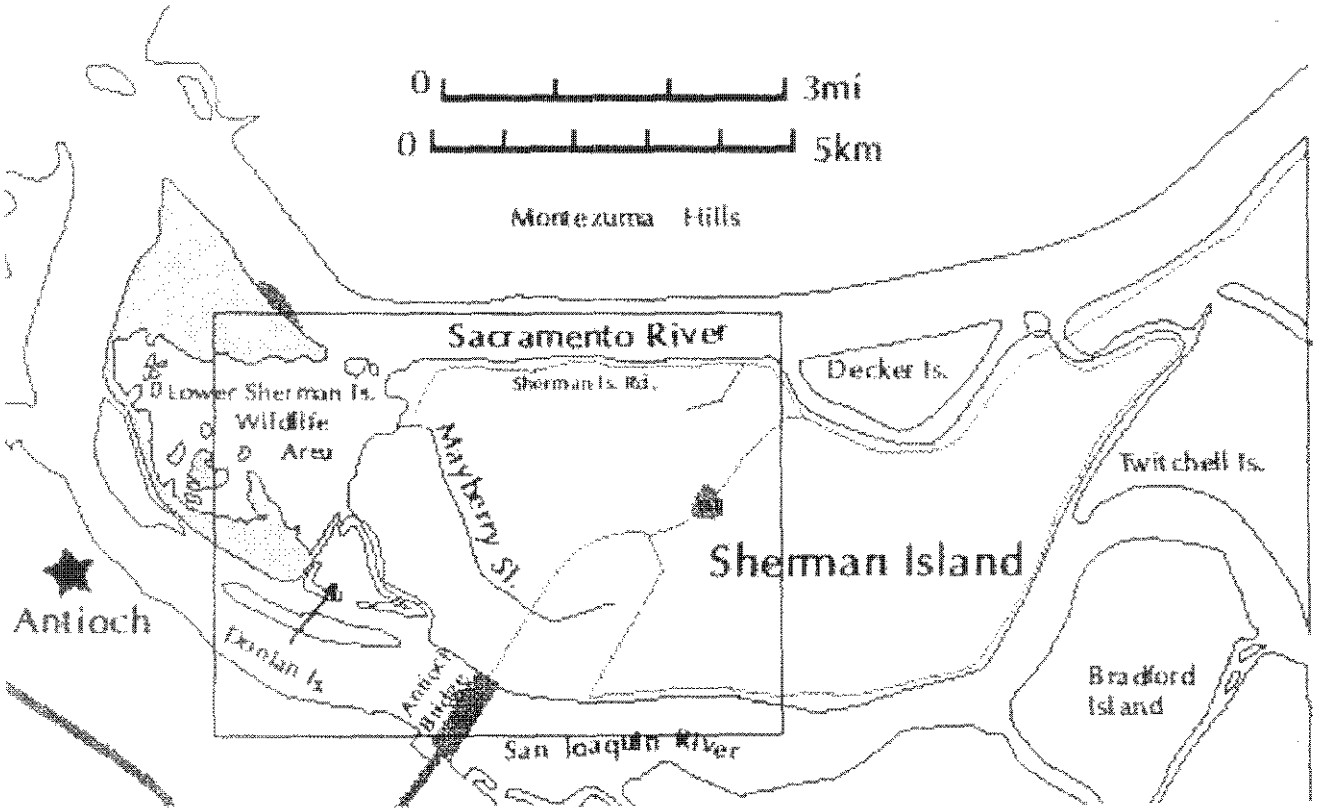
- It would provide maximum flexibility, since material from a single dredging project could be placed in either the habitat or in rehandling units.
- These multiple cells provide flexibility that could be helpful in meeting water-quality requirements.
- A joint project would slightly reduce site preparation costs.
- The rehandling site is likely to result in the loss of some wetlands subject to regulation under Section 404 of the Clean Water Act. The proximity of the habitat restoration unit would allow for mitigation to be provided in the immediate vicinity of the rehandling project.

We have selected the southwest corner of Sherman Island for this conceptual design for a variety of reasons:

- It is the most westerly Delta island, which reduces transportation costs and impacts on air quality.
- Sherman Island's location in the most saline portion of the Delta reduces potential salinity impacts.
- The site is at a particularly significant location from an ecosystem perspective. It is located as the confluence of the two major river systems, offering potential benefits to Delta smelt and downstream migrating anadromous fish such as salmon, steelhead, and striped bass. In addition, during droughts, the most productive part of the Estuary (the location of X2, the point in the Estuary where salinity is two parts per thousand) moves upstream toward Sherman Island. Under current conditions, as X2 moves from the broad, flat, marsh fringed Suisun Bay into the deep, leveed Delta channels, productivity and fisheries suffer substantially. Therefore, habitat restora-

Figure 16. Conceptual Design for a Delta Reuse Project





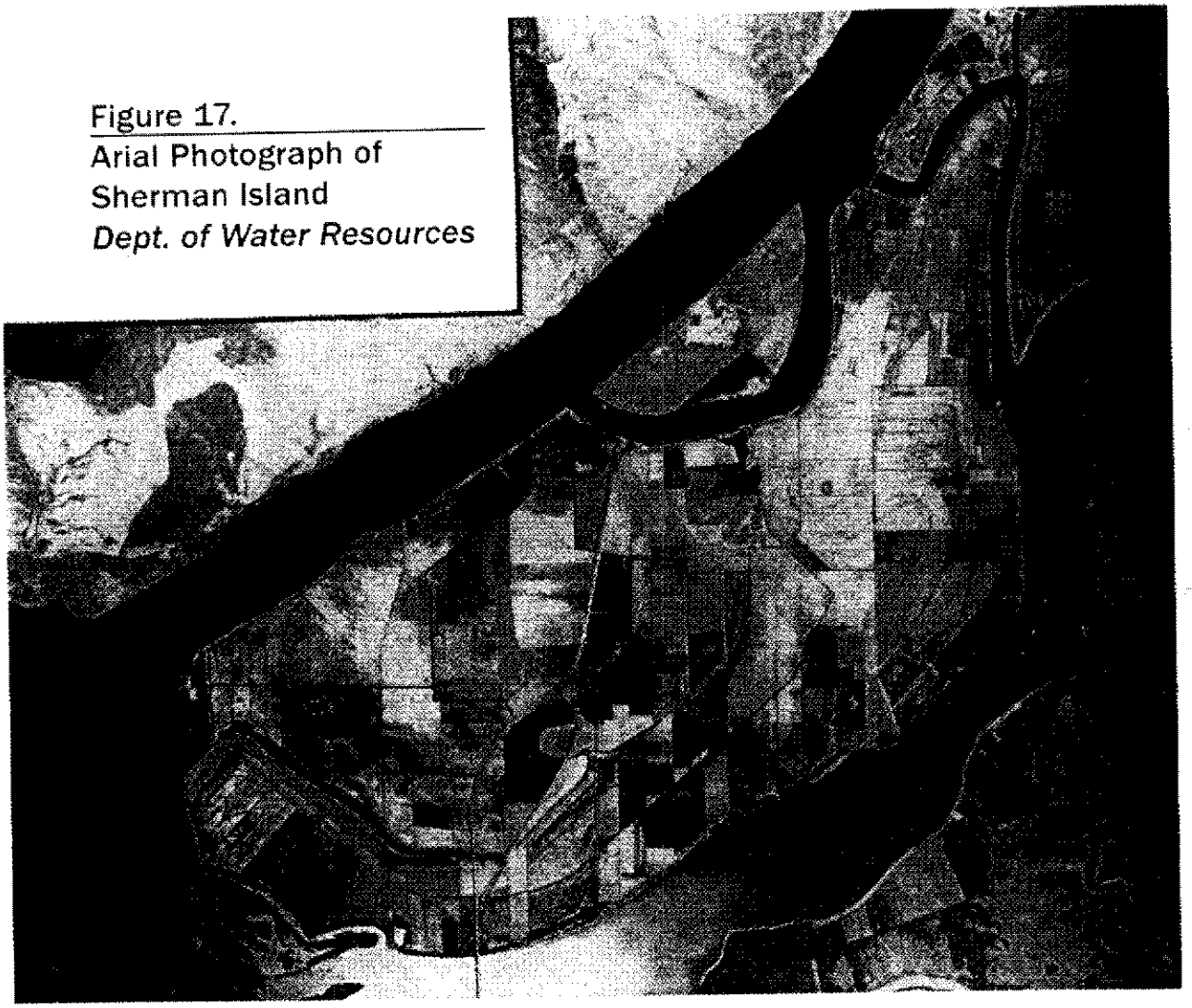


Figure 17.
Arial Photograph of Sherman Island
Dept. of Water Resources

tion in this location provides significant habitat benefits, particularly during dry years.

- The site has excellent deep-water access. Little, if any, dredging would be required.
- Material from the Bay has been taken to this site for levee maintenance. And the site is near the location of Department of Water Resources' rehandling facility for Sherman Island levee maintenance.
- Given the extent of subsidence on Sherman Island, habitat restoration is not possible in the near future without the importation of fill material. This depth also provides maximum capacity for dredged material.
- The site is adjacent to existing habitat, particularly the Sherman Island Waterfowl Management Area and Donlan Island.
- The site is already in public ownership. The Department of Water Resources has purchased almost the entire island over the past five years.
- There are relatively few land-use conflicts in the area (in the highly urban Bay Area).
- Using the existing levee on Mayberry Slough as a containment levee for the habitat restoration unit would reduce levee-construction costs. DWR has already constructed a partial containment levee in this vicinity.

This site is discussed briefly in the 1995 LTMS upland analysis.[9] That document proposed the 1,400-acre River Islands Land Company parcel as a possible restoration site. The capacity of this site, as discussed in this document is 27 mcy, if filled to +three NGVD, comparable to the capacity estimated in this conceptual design. Concerns about this site and alternative sites are discussed later in this section.

Given the proposal (put forth below) that dredging contractors place dredged material on the site, minimal onshore facilities would be required. A few pilings would be necessary. Contractors placing material on the site would require access to the power lines that cross Sherman Island. Given the number of times the site

would be used over the life of the project, possibly by different contractors, it may be appropriate to install a permanent power line to the site.

1. The Rehandling Unit

For several years, the Department of Water Resources has been operating a facility of Sherman Island to rehandle dredged material for reinforcing that Islands levees. DWR has also planned two possible permanent facilities on Sherman Island to facilitate rehandling for levee reuse purposes. They would be constructed on parcels of 78 and 340 acres. An LTMS analysis concluded, however, that the 78-acre parcel would probably be too small to serve as a viable large-scale rehandling site.[57] A previous LTMS report also presented a conceptual plan for a 400-acre rehandling facility.[58] Because these reports have been prepared for the LTMS and because of the significant experience in using Bay material for Delta levee maintenance in recent years, the conceptual design discussion for this unit is relatively brief.

This conceptual rehandling unit is divided into three 100-acre cells. This design provides flexibility in operating the site and increases the throughput of material by allowing one cell to be filled while another is being harvested. Assuming that these cells are filled to a maximum depth of three feet, to ensure that the material would dry rapidly, the site would have a capacity of approximately 1,000,000 cy. This capacity reflects the fact that fine-grained sediments retain water when they are placed by slurrying. This initial bulking can be as much as 40 percent, decreasing the capacity of the site.[59] The actual capacity of the rehandling site would be somewhat greater than this conservative estimate, because sand, the preferred material for levee maintenance, is subject to less initial bulking. A complete cycle of placement, drying, and harvesting would take approximately two years.

Given the size of the habitat and the rehandling units, we assume that the majority of material will be placed in the site hydraulically. However, small projects could be placed in the cells by clamshell. We do not propose to install a permanent pumping facility on the site, but rather that dredging contractors place the material in the site. Maintaining continuity of responsibility for placement would reduce potential expensive delays that could result from breakage of a dedicated pumping facility.

Given a three-foot fill depth, the levees for the rehandling cells could be relatively small (eight feet or less). However, given the variation in subsidence on the site, the actual height of the levees will depend on final design.

After initial placement, material would dry for approximately six months before it could be harvested. Material would be rehandled and transferred onto scows or trucks for Delta levee maintenance;. Highway 160 would provide access for trucks. This design assumes that the vast majority of material would be rehandled either on the island or by scow. Therefore, we have not evaluated potential transportation impacts on Highway 160.

2. The Habitat Restoration Unit

The habitat restoration unit is designed to be 1,200 acres in size. As with the rehandling site, we anticipate that most of the material will be placed hydraulically. The site is designed as a single cell. After the placement of material, the original levee would be breached in one or more locations, allowing the reestablishment of native tules and other wetland vegetation. This conceptual design does not include a detailed proposed habitat design (see the additional issues section).

The capacity of the site is determined by the amount of material required to restore the site to tidal-marsh elevations. This portion of Sherman Island is subsided up to -fifteen feet NGVD. Most tidal-marsh restoration projects have a final design elevation of approximately +two feet NGVD. Some projects, such as Sonoma Baylands, intentionally "undershoot" the final design elevation to allow sedimentation and other natural processes to reach the final elevation and shape the restored wetlands. (Sonoma Baylands was filled to zero feet NGVD, for example.) Therefore, the final capacity of the site would be a function of site design, subsidence, desired elevation types, and the approach to restoration (that is, conservative or filling to the desired final elevation). Given the high degree of subsidence, a 1,200-acre site in this location would have a significant capacity. Assuming a conservative twelve feet of fill, restoring a 1,200-acre site on Sherman Island to tule marsh elevation would require 23 mcy of material. This estimate is conservative, because aggressively dried fine-grained material can shrink by up to 30 percent.[60]

Given the capacity of the site, it is nearly certain that it would be filled in phases—a strategy that would also

provide an opportunity to reduce costs. An initial eight-foot levee would be constructed from native material or from the rehandling site, which could be constructed first. The habitat restoration site would then be filled with three to four feet of material. After that material had dried, it could be used to construct a higher levee on the perimeter of the site. This approach would reduce the total amount of material that would be moved to build the final levee (see figure 18). These levees could be protected from erosion by adding rock to their slopes, by flattening their slopes, or by designing the restored riparian and wetland habitat. The exterior of these levees would also be hydroseeded to reduce erosion.

The existing levees on the San Joaquin River and along Mayberry Sough, on the interior of the Island, surround the habitat-restoration site on three sides, further reducing levee-construction costs. The new perimeter levee would be relatively short (see detail on figure 18). It is also possible that it could incorporate an existing DWR levee near this location.[61]

CALFED has actively supported restoration efforts in both the Delta and the Bay, including the Hamilton Field restoration site. However, from the perspective of CALFED, in comparison with Hamilton Field, this project offers several potential advantages. This conceptual design would:

- Provide benefits to key target species, such as the Delta smelt.
- Allow a dramatic expansion in tidal wetland restoration opportunities in CALFED's primary area of focus-the Delta.
- Reduce conflicts with water projects by providing dry year benefits for fisheries.
- Reduce the vulnerability of Delta islands to catastrophic failure, thus protecting water quality for Delta water users.
- Reduce conflicts with Delta farmers by directing some habitat restoration effort to land already in public ownership and by strengthening the CALFED levee program.
- Reduce agricultural drainage as a result of habitat restoration, including reducing the loading of trihalomethane precursors in the Delta.
- Expand the tidal prism and increase residence time in the Delta, a key factor in ecosystem restoration
- Cap existing sediments, which could reduce the potential for the release of mercury from sediments contaminated by mining, a potential problem that has led some scientists to raise serious concerns about Delta restoration.[62]

The potential for habitat restoration using dredged material on Sherman Island was addressed very briefly in the 1995 LTMS Reuse/Upland Analysis. That study concluded that, "There is a high potential for smaller (smaller than the entire island) tidal wetland restoration projects on Sherman Island especially on the southern and northern portion of the Island."[63]

3. Salinity Control

This conceptual design incorporates several of the measures discussed in section V to reduce potential salinity impacts.

First, this project is located in the western Delta, in substantial part to reduce potential effects of salinity.

Second, in the habitat restoration unit, saline material from the lower Estuary could be capped with less saline material than it would from higher in the Estuary. Material from the Suisun Bay or the Delta could be used as capping material. A three-foot cap could substantially reduce the discharge of salinity when the site is restored to tidal action. An added benefit of such capping is that it would reduce the overall cost of the project: Material dredged from the upper reach of the Estuary would cost substantially less to transport to the site than material from the Central Bay (see figure 19). These savings could come to as much as two to three dollars per cy. The cost estimate below assumes that the final three feet of material in the habitat restoration unit will come from a source with less saline higher in the Estuary. It is important to note, however, that some of the material dredged in the upper Estuary is sand, which makes both a poor substrate for habitat restoration and a poor capping material for containing salinity. Care would need to be taken in designing a project that uses capping as a salinity-control strategy and in selecting appropriate capping material.

Third, material from some small projects could be placed on the site by clamshell (see figure 20). The multiple-cell design would allow runoff from such small projects to be directed to other cells on the site, to be released when salinity is minimal.

Fourth, discharges of saline water from hydraulic pumping could be timed to reduce impacts. Hydraulic placement requires dredged muds to be slurried at a

four-to-one ratio of water to sediment (see figure 21). As a result, hydraulic placement generates a quantity of runoff water four times the amount of material placed on the site. Bay dredged material would be slurried using Delta water. The extent to which such slurrying would allow salinity in Bay sediment to enter the water column has not been determined. However, the runoff water would certainly be higher in salinity than Delta water.

If the site were filled at a rate of 8,000 cy per day (during a large dredging project), hydraulic placement would generate 7.3 million gallons of water per day. Even with a multiple-cell design, it would not be possible to retain all the runoff from a large dredging project for discharge during the wet season. Therefore, runoff from large projects would be discharged within a day or two of placement. Salinity impacts could be reduced by placing the discharge point as far to the west as possible (a deep-water outfall could be added) and by timing discharge to coincide with the outgoing tide. Given Sherman Island's location, runoff discharged during ebb tide would rapidly be carried to Suisun Bay and diluted, thus minimizing the impacts of salinity the Delta. Regional Board staff has indicated that discharges of saline water in this location and during the ebb tide "would not be as problematic as for other areas in the Delta."[64] Additional modeling should be undertaken to determine what effect such discharges would have on the location of X2.

Figure 18. Phased Levee Construction in Habitat Restoration Project

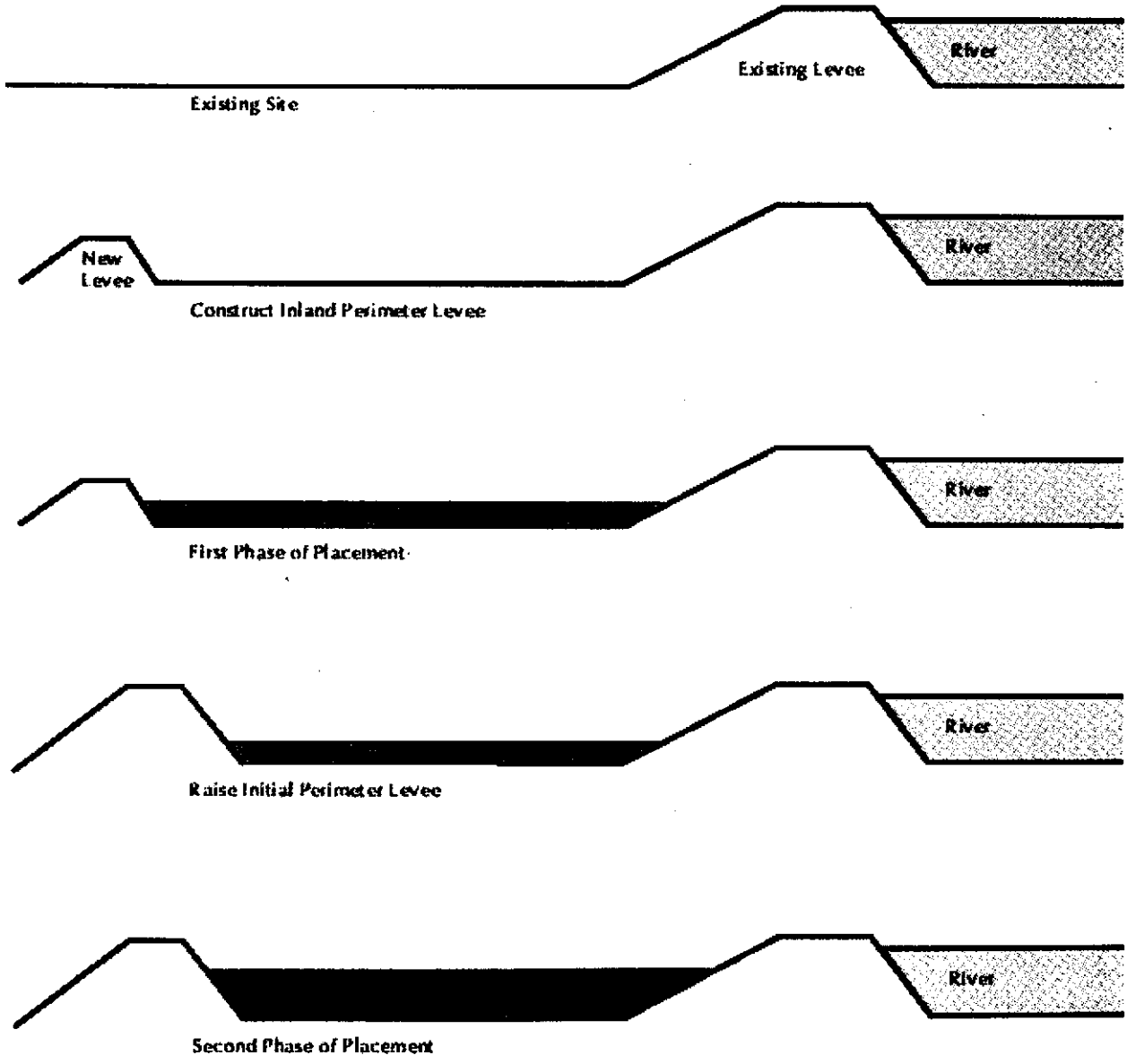
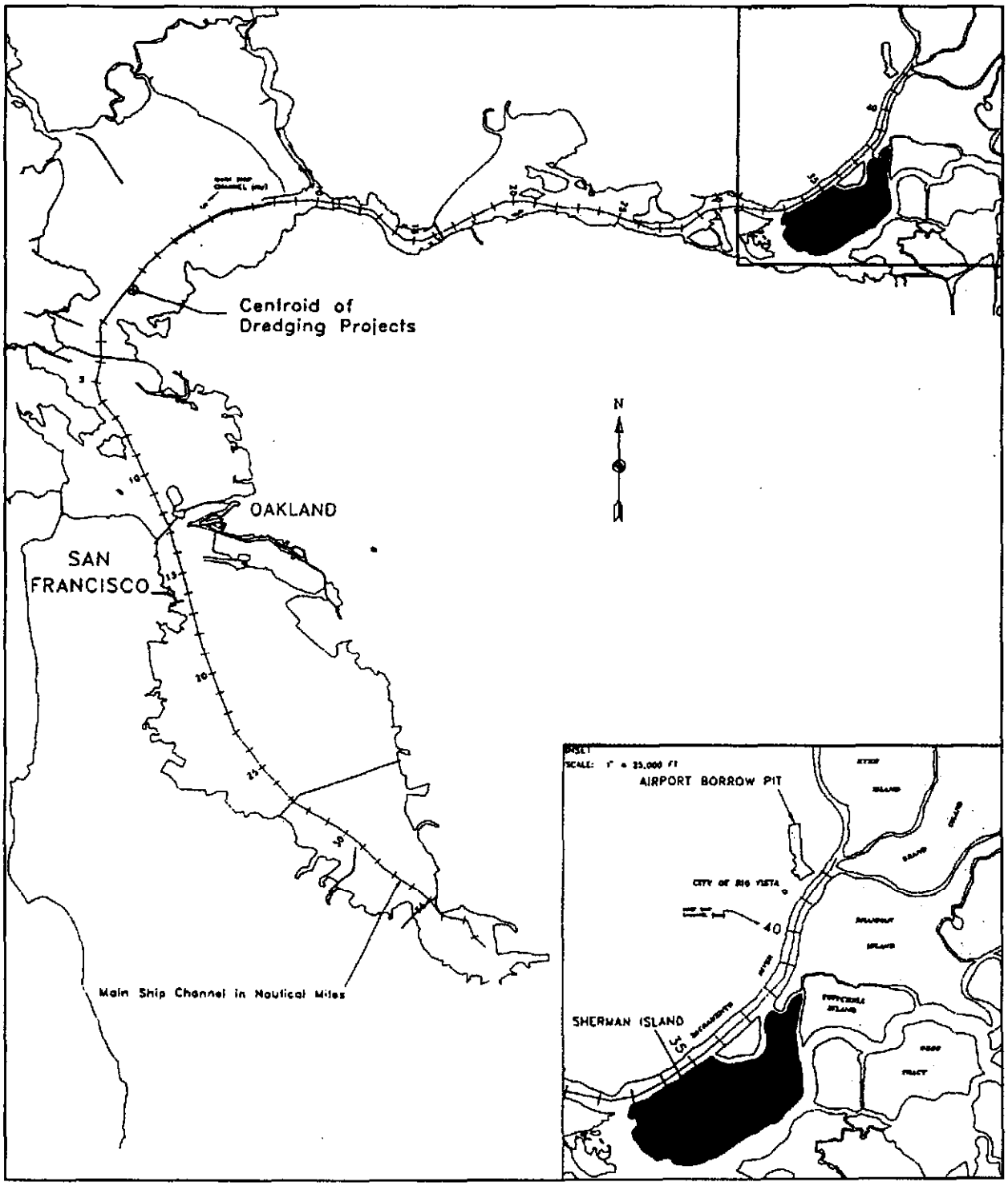
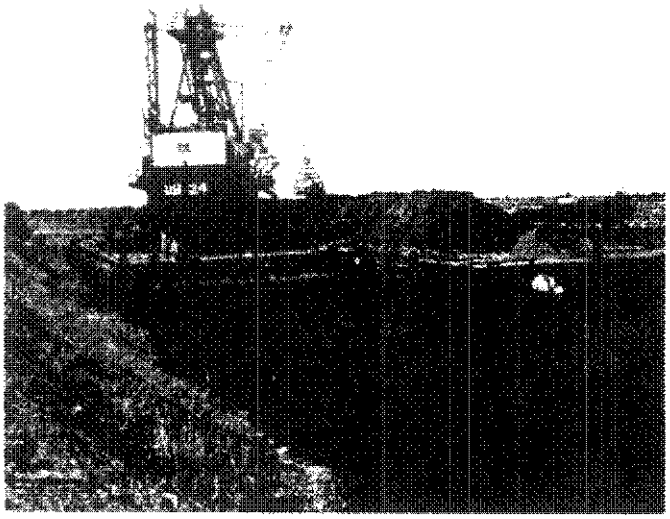
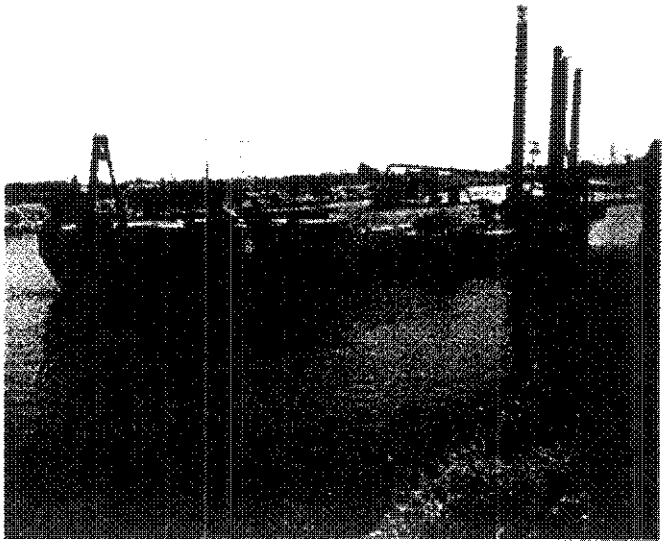


Figure 19. The Bay Dredging Centroid and Distances to the Western Delta



Source: Gahagan & Bryant Associates





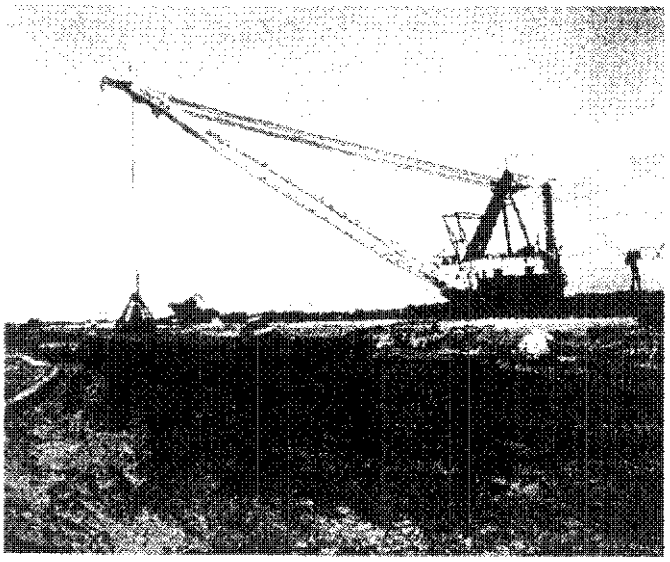


Figure 20 Clamshell Offloading *DWR*

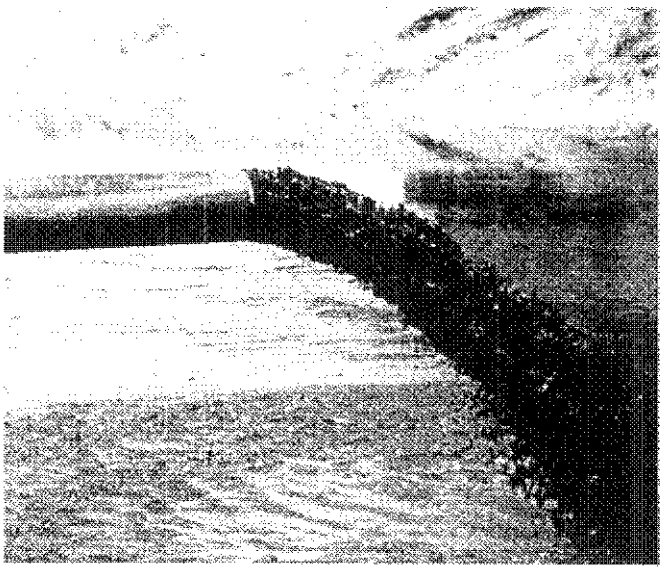


Figure 21. Hydraulic Placement *DWR*

It may also be possible to coincide the time of material placement with high winter flows, a time of year when salinity in the Delta is less of a constraining factor.

Fifth, it may be possible to flush salts out of the site during the winter. During high outflow events, when the location of X2 is not a concern, the rehandling cells could be flooded with low-salinity water. When this water is discharged, it would remove some of the salinity in the near-surface sediment. Over the course of a winter, several flushing cycles may be possible. Although such flushing is unlikely to be needed in the initial stages of filling the habitat restoration unit, flushing could be of value in reducing salinity as the restoration site approaches final design elevations.

In section X, we recommend that the potential of salinity and of the effectiveness of the potential salinity-control measures discussed here and in section V be carefully evaluated.

Cost Estimates and Financing

1. Cost Estimates

DWR is planning to expand the existing dredged material rehandling facility on Sherman Island. We have not been able to obtain cost estimates for this facility. However, we assume that economies of scale should lower the unit cost of material from the rehandling unit in comparison with the reuse projects to date (See sec-

tion VII). The cost estimates below are for the habitat restoration unit of the conceptual design. Cost estimates for this conceptual design were developed from information drawn from a variety of sources.

While this conceptual design is an ambitious project requiring substantial resources, these costs must be evaluated in the following context. They:

- may be overly conservative, given the potential for economies of scale for a project of this size. The final $5.00 cy cost for Sonoma Baylands, for example, was far below the Corps of Engineers initial estimate of $9.10, in addition to site costs.
- are similar to Hamilton Field, the total cost of which could exceed $150 million (see cost estimates, below).
- are roughly comparable to the Hamilton Field restoration project and deep-ocean disposal on a unit-cost basis. The LTMS EIS/EIR calls for 40 percent of Bay dredged material to be disposed at the deep ocean site.
- would be incurred over several years and might not be completed within the seven-year horizon of CALFED's Stage 1.
- could be partially offset by a reduction in costs for CALFED's levee maintenance program.
- represent a cost-effective project, with multiple beneficiaries, which would address the goals of both the LTMS and the CALFED programs.

Financing

Financing a project of this scope will require broad support and multiple funding sources. Fortunately, such a Delta reuse project could be a high priority for both CALFED and LTMS, providing a unique funding opportunity. Section VIII discusses potential financing sources in detail. Clearly, if Delta reuse proves to be viable and to provide significant benefits for both the LTMS and CALFED stakeholder and agency communities, there is a large and diverse set of potential funding sources to support an ambitious reuse program.

Additional Issues, Assumptions, and Alternative Approaches

Preparing the final design for a Delta reuse site will require a number of additional issues to be addressed. Although these issues are important, they are not addressed in this conceptual design since they have minimal impact on the cost estimates and scoping level analysis in this document. Some of these issues are dis-

Table 3 - Estimated Costs for Conceptual Delta Habitat Restoration Unit

	Cost (in millions)
Transportation 17.0 mcy, 35 miles from the dredging centroid (at$.09/cy/mile)	$53.55
Transportation 6.0 mcy, 10 miles from the Delta	5.40
Levees 5,000 lineal feet of levees in 3 phases (at $3.00 per cy)	1.00
Miscellaneous site preparation	0.50
Hydraulic placement 23 mcy ($4.00 per cy)	92.00
Subtotal	152.45
Administration and Management (20 percent)	30.49
Subtotal	182.94
Contingency (20 percent)	36.59
Total	**$219.53**

Average cost per cy (assuming a 23-mcy capacity) = $9.54 per cy

cussed below to assist in the further design of a Delta reuse site. In addition, we have made many assumptions about the design of this project. Below we discuss some alternative approaches that could lead to a different final design.

1. Site Ownership and Operation

There are a number of options for site ownership and operation. The Department of Water Resources owns the site, making that agency an obvious candidate to own and operate this project. In addition, DWR operates an existing rehandling site on the island and has proposed the construction and operation of a permanent Delta reuse site. The Corps or local Delta Reclamation Districts may be interested in operating a rehandling site. However, these agencies would be inappropriate as long-term owners of the habitat restoration unit. The Department of Fish and Game would be particularly appropriate as a long-term owner of this unit. In addition, several other CALFED agencies should be involved in design and could be possible owners. Finally, CALFED may lead to the creation of a new habitat-restoration entity, which could be an appropriate operator and owner of a Delta reuse site.

2. Permits and Monitoring

We believe that the evaluation of potential salinity impacts should be addressed through the LTMS and CALFED processes and should not be considered a cost for this particular project. However, the project will require a waste discharge permit from the Central Valley Regional Water Quality Control Board. This conceptual design has not addressed all the permits necessary for such a reuse project or the extensive water quality, biological, physical, and other monitoring that would be required. These costs would be included in the contingency line item in the budget for the conceptual project.

3. Management and Administration

The project sponsor may or may not be the actual owner and operator of the site. A number of LTMS and CALFED agencies and stakeholder groups may participate in the planning and management of a Delta reuse site.

4. Final Habitat Design and Site Elevations

The Sherman Island habitat restoration site could be designed to include a wide range of habitats (for example, deep water, dead-end sloughs, mudflats, riparian habitat, tule marsh, habitat islands, and upland habitat). On the Sonoma Baylands site, peninsulas were constructed to reduce wind fetch and to assist in natural sedimentation. The same approach may be necessary for a larger site on windy Sherman Island. Final habitat goals for the site, the design of channels, islands, peninsulas, and final elevations and the restoration method (conservative or filling to final desired habitat elevations) should all be developed through broad agency, scientific, and public involvement. Final design should include many of those who have participated in the CALFED Ecosystem Restoration Program and the Bay habitat goals efforts. Final design will, of course, affect the capacity of the site. However, we have made simple assumptions about subsidence and capacity to develop rough estimates of capacity and cost.

5. Appropriate Substrate

Delta tule marshes evolved during a period of rising sea level and consist primarily of peat-decayed organic material-although there are some mineral soils on Delta islands. Dredged material consists of a variety of types, from fine silts to coarse sand. Some of this sediment is low in organic material. Also, much of the material in the upper reach of the Estuary is sand (the first material to settle out of rivers entering the Estuary), which is not ideal substrate for wetland vegetation. One possible strategy to address this issue, which has been used elsewhere, is to augment sediments with organic material. For example, peat could be placed on top of dredged material in the habitat restoration unit. This material could come from elsewhere in the Delta or could be excavated from the restoration site itself and stockpiled. Rice straw is another possible source of organic material. (Rice straw burning is currently being phased out, and rice farmers are actively investigating alternative uses of this material.) In fact, CALFED recently decided not to fund a proposal to bring rice straw to the Delta for this purpose. The need for such augmentation can be better determined through the design process. The approach to filling the site (conservative or aggressive) may also affect the need for substrate augmentation.

6. Delta Sediment Traps

Prior to diking, Delta islands served as enormous sediment traps. However, upstream dams have robbed the system of sediment from the upper watersheds. The diking of Delta islands also reduced in-Delta sedimentation. As a result, there is a shortage of in-Delta material for habitat restoration and levee maintenance. To

address this issue, CALFED staff has considered constructing sediment traps in the Delta. These traps would most likely consist of islands, or portions of islands, that would be breached to collect sediment as river flows pass through the Delta. Another option would be to use siphons to flood Delta islands to remove sediment. This sediment could be used to restore habitat in the sediment trap site or to provide material for levee maintenance and habitat restoration elsewhere in the Delta. Delta sediment traps are still in the conceptual stage, and the potential effects of removing sediment from the Bay have not been addressed (particularly since marshes in some parts of the Bay are eroding). However, if proven to be feasible, such sediment traps could be jointly managed with this conceptual plan for a Delta rehandling and habitat restoration site.

7. Location of the Reuse Project

The site selected for this conceptual design raises some potentially serious issues that must be considered in selecting a final site for a reuse project:

- There is a 35-foot high-pressure transcontinental natural gas main in the vicinity of the project. Investigations by the Corps have indicated that no overburden could be placed within the right of way.[65]
- The site may conflict with existing high-tension power lines.
- There may be conflicting uses along the levee in this area. Although DWR has purchased virtually the entire site, approximately 100 acres remain in private ownership. Care should be taken in designing a final site to reduce impacts and potential costs related to these uses.
- This site contains deep peat soils (up to 30 to 40 ft.[66]), which raise issues concerning the stability of containment levees and the habitat restoration unit.

Further, although the high degree of subsidence on Sherman Island presents an advantage to the LTMS, this advantage may be a disadvantage to habitat. Because of the extent of subsidence, placing material on this site would result in less habitat acreage than if the same volume of material were placed on a site with less subsidence. If the salinity problem can be overcome, it may be possible to locate reuse projects on less subsided sites in the Delta with the potential for a significant increase in habitat restoration. Likewise, it may be possible to design a tidal wetland restoration project downstream, on Winter Island or in the diked areas of Suisun Marsh.

Finally, though we have selected the southwest corner of Sherman Island for a variety of reasons discussed above, a more complete investigation may reveal better locations on the Island for this project. One possible alternative location is discussed in the 1995 LTMS upland analysis.[67] The northern tip of Sherman Island may also have potential as a habitat restoration site. This site, however, is east of that selected for our conceptual design, thus increasing potential salinity impacts. Locating a project on the northwest corner of the site was rejected due to conflicts with land uses along Sherman Island road.

In the design of a Delta reuse project, care must be taken to minimize, avoid, and mitigate impacts on existing natural resources. However, these impacts must be evaluated in light of the potential environmental benefits of Delta habitat restoration.

Phasing of Levee Construction

Another key feature of this conceptual design is the plan to fill the habitat restoration unit over the course of several years. Given the capacity of the site, it is highly unlikely that it could be filled rapidly. This design reduces levee construction costs in comparison with the cost of building the perimeter levee for the habitat restoration unit to final height at the beginning of the project. This design would also allow material in the habitat unit to dry to a much greater extent, which would increase the stability of the site and reduce the potential for salinity discharges, either due to levee failure or to the release of unconsolidated material that would result from a rapid filling of the site. However, if a particularly large dredging project were planned, it might be cost effective to construct a containment levee to final height in a single phase. Such an approach would reduce the capacity of the site, because slurried material, if retained in a saturated state, can occupy 120 percent of the initial volume.[68]

Wildlife and Habitat Impacts

Sherman Island has been aggressively farmed for over 50 years. However, in recent years, some of the land on the island has been fallow, which may have allowed populations of native vegetation and wildlife to

increase. One rare plant species—Mason's lilaeopsis—has been observed on the site, and habitat exists for California hibiscus, a "candidate" species are present on the site. However, the hibiscus habitat is on the exterior of the levee and two of the three sightings of Mason's lilaeopsis were on the exterior of the levee. Therefore, carefully designed restoration might benefit these species. We were not able to determine if a jurisdictional determination has been performed for Sherman Island. However, the Negative Declaration for the Sherman Island Wildlife Management plan suggests that Section 404 permit issues should be manageable.

Nine bird species of concern have been recorded on the site. Habitat exists for endangered bird species on the island, but none were observed. Several of these species would benefit from habitat restoration. However, special care must be taken to avoid impacts to species of concern that are dependent on terrestrial habitat, such as the burrowing owl. (No evidence of burrowing owl nesting has been discovered, but nesting habitat is present on the Island.) There has been one sighting of the giant garter snake near the site for this proposed conceptual design.[69]

In the design of a Delta reuse project, care must be taken to minimize, avoid, and mitigate impacts on existing natural resources. However, these impacts must be evaluated in light of the potential environmental benefits of Delta habitat restoration.

VIII. Costs and Financing

Large-scale Delta reuse of dredged material will require substantial financial resources, however there are a wide variety of potential funding sources for Delta habitat restoration.

Disposal Cost Estimates

The cost of dredged material disposal can be broken down into fixed costs and variable—or quantity dependent—costs. Fixed costs are set expenses determined by project design and do not vary greatly with quantities dredged, including the expenses of equipment mobilization/demobilization, planning, design, engineering, and initial construction costs. Variable costs fluctuate with the quantity of material and include transportation, off-loading the material at the disposal site, and rehandling. Disposal costs do not include the cost of dredging itself, as these costs are unchanged by the selection of disposal sites.

The fixed costs for the designated in-Bay and ocean disposal sites are, in general, much lower than those for upland sites. The designated in-Bay sites have been in operation for several years, and the planning, design, engineering, and initial construction expenses no longer factor into current disposal costs.

Transportation costs are largely dependent upon the quantity of material and the distance between dredging and disposal sites. Ocean disposal can include an additional cost, because the tugs and scows for ocean disposal must be suitable for operation in the open ocean. The choice of a disposal site is dictated by the dredging location, type of material, quality of material, quantity of material, quantity of material recently disposed at possible disposal sites, commitments to a particular site, and other factors.

The cost of disposal, exclusive of dredging, at current in-Bay disposal sites is between $4 and $6 per cy, while the cost for ocean disposal at the designated Deep Ocean Disposal Site (SF-DODS) is between $6 and $8 per cy[70] (see table 1). The cost for upland disposal of dredged material for restoration purposes is between $7 and $16 per cy.[71] Existing estimates for the cost of Delta Island disposal of Bay dredged material for levee maintenance purposes is between $12 and $15 per cy. The Delta Island costs are taken from projects to date, which have been relatively small in scale. Larger Delta reuse projects could lower these costs through economies of scale. We have been unable to locate cost estimates for Delta habitat restoration using Bay dredged material (see cost estimates in section VII).

...one of the strengths of the Delta reuse concept is that the broad array of potential beneficiaries presents a wide range of possible funding sources.

The economies of scale of larger projects reduce the unit costs, since fixed costs remain relatively constant. This cost reduction can be dramatic. In the case of the Sherman Island project, an initial bid from the Manson Construction and Engineering Company to move 10,000 cy of dredged material was for $10.44. When the project was reduced to a 1,600-cy project, the cost per cy rose approximately 25 percent.[72] Disposal at the Hamilton Army Airfield restoration site, which would accommodate 10.2 mcy of material, is between $7.4 and $11.3 per cy. The disposal cost at the Montezuma site ($7 to $10 per cy without the tipping fee), which is approximately the same distance from the centroid of the Bay as many of the western Delta islands, shows that moving a greater quantity of material can reduce the cost to a value comparable with dumping at designated sites, such as the deep-ocean disposal site.

Reducing the distance between dredging and disposal site can lower transportation costs. Suisun Bay is the closest part of the Bay to the Delta. 200,000 cy of material are dredged from Suisun Bay Channel and New York Slough annually.[73] Historically, this material has been deposited in the Suisun Bay or Carquinez Straight designated disposal sites. If material from the Suisun Bay were used in the Delta,

Table 4 - Dredged Material Disposal Options

Disposal Site	Implementation Costs (million dollars)[74]	Disposal Cost[75] (dollars per cy)	Site Capacity
Alcatraz (SF-11)	0	4	4.0 mcy/yr
Carquinez Strait (SF-9)	0	5-6	2-3.0 mcy/yr
San Pablo Bay (SF-10)	0	4-5	500,000 cy/yr
Suisun Bay (SF-16)	0	5.5	200,000 cy/yr
SF Deep Ocean Disposal Site (SF-DODS)	5	6-8	4.8 mcy/yr
Hamilton Army Airfield (HAAF)	55	7.4-11.3	10.2 mcy
Mare Island	0.4	7	12.0 mcy
Montezuma	To be borne by project applicant	16[76]	17.0 mcy
Sonoma Baylands	7.6	5	Completed
Winter Island Levee Maintenance	1.7	15[77]	100,000 cy/yr
Sherman Island Levee Maintenance	Considered in the disposal cost	12-13[78]	N/A
Jersey Island Levee Maintenance	Considered in the disposal cost	15[79]	N/A
Twitchell Island Levee Maintenance	0.083	9.72[80]	N/A
Sherman Island Conceptual Design Estimated Cost for Habitat Restoration	Considered in the disposal cost	9.74	10 mcy

transportation costs, and thus disposal costs, could be reduced.

Potential Funding Partners

Large-scale Delta reuse of dredged material will require substantial financial resources. However, one of the strengths of the Delta reuse concept is that the broad array of potential beneficiaries presents a wide range of possible funding sources. These funding sources generally fall into three categories: funds that are available for dredging projects, habitat restoration projects, and levee maintenance projects. Some of these potential sources are discussed briefly below.

Dredging

The Corps of Engineers annual national operations and maintenance budget, which supports dredging around the nation, is approximately $1.9 billion per year. The San Francisco District's annual dredging budget is approximately $10 million. Congress is currently considering a Water Resources Development Act, which is the primary federal funding vehicle for dredging projects. Future WRDA reauthorizations would be likely sources of funding for reuse projects.

Local agencies (ports, marinas, flood control districts, and so on) pay a substantial share of the cost of Corps dredging projects and bear the entire cost of non-Corps

projects. The Port of Oakland, for example, plans to pay $124 million toward the cost of the Port's proposed $254 million project to deepen channels to 50 feet.

Habitat Restoration

There are a wide variety of potential funding sources for Delta habitat restoration. The largest single potential source of funding for habitat restoration is the CALFED Bay-Delta Program. CALFED is currently preparing a financing plan for its preferred alternative. The draft finance plan indicates that the CALFED ecosystem restoration program (which does not yet include adequate Delta restoration measures) will cost $910 million during the first seven years. The draft plan indicates that funding for the implementation of the CALFED program will come from a variety of possible sources:

- General obligation bonds
- Water and power revenue bonds
- State and federal appropriations
- Private financing
- Broad-based water diversion fees

At least under some conditions, all these sources could make appropriate funding partners for a Delta reuse program. The scale of habitat restoration funds potentially available through CALFED is significant. For example:

Proposition 204: The Clean, Safe and Reliable Drinking Water Act was passed by California voters in 1996. Among other provisions, it provided $540 million for habitat restoration. Of this amount, $150 million was available immediately upon passage. $390 million will be released only when the CALFED program has adopted a final preferred alternative and upon a finding by the Secretary of Resources that the program is being implemented appropriately.

The Bay-Delta Act: Also in 1996, Congress authorized $430 million in federal funding for Bay-Delta habitat restoration through the Bay-Delta Act. At the end of the fiscal year 2000, this three-year authorization will expire, by which time approximately half of the authorized amount will have been appropriated. It is not yet clear if this authorization will be extended or if there will be a separate authorization for the implementation of the CALFED preferred alternative. However, it is clear that when interests in California unify around the need for restoration of the Bay-Delta ecosystem, the state's congressional delegation is capable of securing substantial federal funding.

Central Valley Project Improvement Act: The CVPIA was passed in 1992 and calls for the Department of Interior to develop and implement a program that would double the population of anadromous fish in the Central Valley. One of the primary tools provided by Congress to accomplish the "doubling goal" is the CVP Restoration Fund. The Fund receives up to $50 million per year in contributions from CVP water and power customers. Given the potential benefits to anadromous fish, Delta habitat restoration projects are eligible for funds from the Restoration Fund.

Other Potential Federal Funding[81]

Water Resources Development Act of 1992: This act provides funds, approximately $6 million in fiscal year 1998, for the USACE to provide specialized services to operate and manage natural resources and recreational facilities at Army Corps water resource development projects as part of the Challenge Cost Share Program. Section 204 of the WRDA (Beneficial Uses of Dredged Materials) provides additional funds for the USACE to aid state and local communities in protection, restoration, and creation of habitats in connection with dredging operations. Because of the nature of Delta island restoration projects, and the possible role of the USACE in these projects, they can be eligible for funds from the WRDA of 1992. The Sonoma Baylands project received approximately $2 million in funding from Section 204.[82]

Water Resources Development Act of 1996: Section 206 of the WRDA of 1996 (Aquatic Ecosystem Restoration) provides funds to pay for USACE services to implement aquatic ecosystem restoration projects to improve environmental quality. The Study and Project Specific Programs of the Civil Works Environmental Program (SPSPCWEP) provides hundreds of millions of dollars annually in USACE services to support restoration activities within study and project specific appropriations of the Civil Works Environmental Activities. Because of the nature of Delta island restoration projects, and the possible role of the USACE in these projects, they can be eligible for funds from Section 206 and the SPSPCWEP of the WRDA of 1996. The Hamilton Army Airfield project is likely to benefit from the WRDA. The federal share of the $55.1 million implementation cost for Hamilton will be 75 percent, or $41.37 million.[83]

Department of Agriculture Appropriations Act of 1997: This act, through the Watershed and Air

Management Cost Share Program, calls for the Forest Service to share the cost of grants to evaluate, protect, and restore water, soil, and air resources.

Watershed Protection and Flood Prevention Act: The WPFPA provides over $100 million for the Natural Resources Conservation Service to provide technical and financial assistance to improve watershed areas.

Wetlands Reserve Program: The WRP provides, through the NRCS, direct funds to protect and restore wetlands, riparian and buffer areas. This program focuses completely on restoration and protection.

Anadromous Fish Conservation Act: With an annual budget of $2 million, this Act calls for the National Oceanic and Atmospheric Administration and the Fish and Wildlife Service to provide grants to states for conserving and enhancing fish stocks. Given the potential benefits to anadromous fish, Delta habitat restoration projects are eligible for funds from this act.

Water Resources Development Act of 1974: The WRDA of 1974 provides several million dollars ($3 million in fiscal year 1998) worth of USACE services to states and territories through the Planning Assistance to States Program to plan for the development, conservation, and utilization of water and related land resources.

Water Resources Development Act of 1986: Section 1135 of the WRDA of 1986 provides funds to pay for the USACE services in modifying existing project facilities and areas to achieve ecosystem restoration.

Wetlands Protection Development Grant: The WPDG, under the Clean Water Act, provides grant funds, $15 million annually between fiscal years 1996 and 1998, to develop and enhance existing wetlands programs. Wetland restoration is a significant part of the program.

Challenge Grant Cost Share Program: The Fish and Wildlife Service provides the CGCSP grant money to manage, enhance, and restore fish and wildlife resources. In previous years habitat restoration accounted for a large portion of the projects supported by the grant.

Endangered Species Conservation Fund: The Fish and Wildlife Service provides the ESCF grant money to projects that develop programs for the conservation of endangered species. Given the potential benefits to endangered species that use the Delta, Delta habitat restoration projects should be eligible for ESCF grants.

Levee Maintenance

The CALFED draft finance plan indicates that CALFED's levee maintenance program will require $264 million during its first seven years. Many of the funding sources discussed above would also be appropriate for levee maintenance projects.

Water Resources Development Acts of 1974 and 1992: See the discussion above regarding habitat restoration.

SB34-The Delta Flood Protection Act of 1988: This act amended the Delta Levee Maintenance Subvention Program, established in 1973, to provide state financial assistance to local districts for maintaining and improving nonproject Delta levees. The term "nonproject" is used to distinguish the levees from the "project" levees, which are part of federal flood-control projects. Local agencies will be eligible for reimbursement upon submission to and approval by the Reclamation Board of plans for the maintenance and improvement of the nonproject levees. This Bill expired on January 1, 1999.

AB 360: The Assembly Bill revised the provisions for the Delta Levee Maintenance Subvention Program, to extend the existence of the fund until July 1, 2006. AB 360 appropriated $6 million annually for local assistance under the DLMSP and the administration thereof.

IX. Institutional Challenges and Opportunities

The Army Corps of Engineers, The United States Environmental Protection Agency and the Bay Conservation and Development Commission should work together to establish policies for dredge material rehandling in the Delta, with a consistent set of principles, permit procedures, and criteria to evaluate projects. The biggest challenge will be to bring together all of the different requirements and make them consistent with one another, without losing important economic or environmental protections.

In the past, dredged Bay material has been viewed as a waste requiring disposal rather than a resource with potential for reuse. The policy of Bay Area agencies working with dredged material is to change this view, but some agencies have not implemented such a shift in policy.

As with other development projects, each reuse project must be examined on a case by case basis. The concerns of nearby citizens and communities about potential environmental impacts need to be addressed sensitively. In addition, there are challenging legal and institutional issues to overcome. Depending on the location and type of project, 10 to 15 different planning and regulatory agencies could be involved on the federal, state, regional and local level, which may result in conflicting guidance and responsibility. However, identifying these potential obstacles in the early stages would greatly reduce uncertainty and time delays associated with regulatory compliance and permit processing.

The United States Environmental Protection Agency

The EPA's mission is to protect human health and safeguard the natural environment. The EPA is responsible for enforcing the National Environmental Policy Act (NEPA) and the Clean Water Act, with the authority to determine the particular waste category and issue waste discharge permits.

The United States Army Corps of Engineers

The Army Corps shares joint authority with the US EPA for enforcing section 404 of the Clean Water Act.

The US Fish and Wildlife Service

This agency has jurisdiction for all listed species under the federal Endangered Species Act. For any reuse project it would be prudent to conduct an early assessment of species listed as endangered or threatened, under consideration for listing, considered jeopardized, or are being petitioned to be listed. The US Fish and Wildlife Service is also responsible for the Fish and Wildlife Service Coordination Act, a consultation statute which requires agencies that impact fish and wildlife to talk to the US Fish and Wildlife Service.

The National Marine Fisheries Service (NMFS)

The NMFS would play a role if any of the proposed facilities have the potential to affect anadromous species.

California Department of Fish and Game

The Department of Fish and Game enforces the California Endangered Species Act, which is very similar to the federal Endangered Species Act, but there could be overlapping issues.

Regional Water Resources Control Board(s)

The Regional Boards have delegated authority from the US EPA to interpret the Clean Water Act and play a role in permitting.

Dredge Material Management Office (DMMO)

Agencies with responsibilities for dredging have assembled a "Dredge Material Management Office" that may facilitate permitting for these types of facil-

ities. Further exploration is needed to determine how the DMMO would be able to assist in eliminating complex agency jurisdictional issues, and facilitating dredging permit processing.

State Lands Commission (SLC)

This Commission has a public trust responsibility for the State's tidal and submerged lands and is likely to play an important role in this kind of activity in the Delta.

Integrated Waste Management Board (IWMB)

Involvement of the IWMB depends upon the assessment of sediment quality and how the material load is actually defined.

The Delta Protection Commission (DPC)

Although the DPC does not have permanent authority, it is responsible for planning in the Delta. Projects in the Delta should be consistent with the DPC's Resources Management Plan.

Local Issues and Regulations

Under California law, land use policy is made at the local level. Local governments have final authority over areas outside of the Bay zone or Delta levees, unless they fall into categories regulated by the Army Corps of Engineers. It will be essential to determine how the local General Plans and zoning ordinances treat proposed project sites. Although general plans and zoning ordinances can be changed, the project uses must conform.

CALFED

Although CALFED has no regulatory or permitting authority, it has political sanction to do restoration and water resource planning for the entire state—and most significantly for the Bay and Delta. CALFED has created an important precedent by establishing a forum where agencies can come to some agreement about how to work together. CALFED could help reduce conflicting and overlapping jurisdictions by convening the relevant agencies.

Conclusion

State and federal laws do allow pursuit of large-scale beneficial reuse of Bay dredged material in the Delta. However, overlapping agency jurisdictions could deter beneficial projects unless agencies cooperate closely with each other.

X. Conclusions and Recommendations

Conclusions

- There is a significant need for a program to maintain the integrity of Delta levees.
- An enormous volume of material will be required to maintain Delta levees, and existing in-Delta sources of material are inadequate to meet either habitat restoration or levee maintenance needs.
- Restoring extensive shallow-water or tidal-marsh habitat in the western or central Delta would have dramatic ecosystem benefits, with indirect benefits for Delta water diverters.
- Without an aggressive subsidence reversal strategy, much of the Delta, particularly the western and central Delta, cannot be restored to shallow-water or tidal-marsh habitat in the near future.
- LTMS goals regarding beneficial reuse of dredged materials are unlikely to be met over the next 50 years without significant Delta reuse of Bay material. Material targeted for ocean disposal by the LTMS could be redirected to reuse projects.
- The cost of Delta reuse appears to be comparable with other disposal options under consideration and in actual use.
- Salinity is the major constraint on the Delta reuse of materials dredged from the Bay. Several potential salinity control strategies are worthy of further investigation.
- Several levee demonstration projects using dredged material have been completed and have not revealed a significant salinity problem.
- State law does allow a thoughtful course of investigation into Delta reuse of Bay dredged material.
- A large-scale joint habitat restoration and rehandling project could be a cost-effective method of addressing a wide range of goals of the LTMS and CALFED, and an LTMS/CALFED partnership offers the potential for a broad range of funding partners to support Delta reuse.

Recommendations

1. CALFED and LTMS Joint Strategy. CALFED and LTMS policy-level decision-makers should discuss the potential for Delta reuse of Bay dredged material, and develop a joint strategy to investigate and, as appropriate, implement such reuse.

2. Delta Habitat Restoration Pilot Project. As a part of its Ecosystem Restoration Program, CALFED should build on the apparent success of the Delta levee demonstration projects by designing and implementing a pilot project to investigate salinity-control strategies and other related issues.

3. CALFED Ecosystem Restoration Program. The Ecosystem Restoration Program effort should be revised to fund an investigation into the habitat restoration opportunities presented by Delta reuse of Bay material. CALFED restoration goals should be revised for the central and western Delta, and a recommendation regarding the acceptability of significant Delta reuse in the final Ecosystem Restoration Program Plan should be developed.

4. CALFED Levee Program. CALFED's Levee Program should be revised to include a careful review of the results of Delta demonstration projects using Bay materials. An investigation of additional issues raised by Delta reuse should be undertaken, and a conclusion reached regarding the acceptabil-

ity of significant Delta reuse as a part of the levee plan.

5. Regional Water Quality Control Board Resources. Because both CALFED and LTMS are rapidly moving toward major decisions, they should investigate whether the Regional Board has adequate staff and other resources to study and resolve salinity and other water-quality issues raised by Delta reuse of Bay material. If required, additional resources should be provided immediately.

6. Ocean Disposal. LTMS agencies should consider the potential benefits of Delta reuse and potential demand for material in the Delta and evaluate the wisdom of the LTMS decision that 40 percent of Bay dredged material may be disposed at the deep-ocean disposal site.

7. Large-Scale Delta Reuse. Once a Delta habitat restoration demonstration project is undertaken, CALFED and LTMS should fully evaluate the feasibility and design of a large-scale Delta reuse project.

XI. Contacts

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41. Port of Oakland, FEIS/EIR.
42. LTMS FEIS/R, pp. 6-23
43. Personal communication with Kathy Broderick
44. LTMS FEIS/R, pp. 6-27
45. Personal communication with Margit Aramburu
46. Sam Luoma, USGS, personal communication

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Executive Summary

Dredging in the San Francisco Bay Estuary will continue as long as the region remains a major shipping and recreational boating center, with large ships requiring deep channels to access port facilities, and smaller craft needing access to marinas. But dredging yields a tremendous volume of sediment requiring disposal, and traditional Bay or ocean dumping can be detrimental to the ecosystem. Upstream in the Delta there is a shortage of clean Bay dredged material to maintain levees and to restore degraded habitat, especially on severely subsided islands.

Is it feasible to simply shift disposal of these dredged spoils to the Delta for maintenance and reuse projects? Or does the salt in Bay sediment pose a major obstacle to Delta reuse of clean dredged materials from the Bay, a threat to Delta water quality, habitat and species?

This report identifies the challenges of dredged disposal reuse, and makes recommendations regarding its technical and economic feasibility. Salinity, costs and financing, legal and regulatory issues, engineering and design challenges and environmental impacts are all examined. The report identifies several potential salinity control strategies that are worthy of further investigation, and describes several levee demonstration projects that have used dredged material without revealing a significant salinity problem. The report outlines a conceptual design for a Delta restoration pilot project using dredged materials on Sherman Island, at the confluence of the Sacramento and San Joaquin river systems, near the most biologically productive part of the Estuary. This pilot project, if implemented, could yield valuable data.

The Long-Term Management Strategy (LTMS) interagency process is working to identify alternatives to the in-Bay disposal of dredged material, while the CALFED Bay-Delta Program is developing long-term levee protection plans and habitat restoration programs. The report recommends collaboration between LTMS and CALFED to investigate potential benefits of a broader habitat restoration and material rehandling project. If large scale Delta reuse is feasible, it could provide benefits to key target species, expand the tidal prism and increase residence time in the Delta, reduce agricultural drainage with a reduction in trihalomethane precursors, and strengthen the CALFED levee program while reducing the vulnerability of Delta islands to catastrophic failure.

The report finds that Delta reuse of clean Bay dredge materials could resolve some very complex problems in a cost-effective and environmentally beneficial way and recommends further investigation:

Conclusions

- There is a significant need for a program to maintain the integrity of Delta levees.
- An enormous volume of material will be required to maintain Delta levees, and existing in-Delta sources of material are inadequate to meet either habitat restoration or levee maintenance needs.
- Restoring extensive shallow-water or tidal-marsh habitat in the western or central Delta would have dramatic ecosystem benefits, with indirect benefits for Delta water diverters.
- Without an aggressive subsidence reversal strategy, much of the Delta, particularly the western and central Delta, cannot be restored to shallow-water or tidal-marsh habitat in the near future.
- LTMS goals regarding beneficial reuse of dredged materials are unlikely to be met over the next 50 years without significant Delta reuse of Bay material. Material targeted for ocean disposal by the LTMS could be redirected to reuse projects.
- The cost of Delta reuse appears to be comparable with other disposal options under consideration and in actual use.
- Salinity is the major constraint on the Delta reuse of materials dredged from the Bay. Several potential salinity control strategies are worthy of further investigation.
- Several levee demonstration projects using dredged material have been completed and have not revealed a significant salinity problem.

- State law does allow a thoughtful course of investigation into Delta reuse of Bay dredged material.
- A large-scale joint habitat restoration and rehandling project could be a cost-effective method of addressing a wide range of goals of the LTMS and CALFED, and a LTMS/CALFED partnership offers the potential for a broad range of funding partners to support Delta reuse.

Recommendations

1. **CALFED and LTMS Joint Strategy.** CALFED and LTMS policy-level decision-makers should discuss the potential for Delta reuse of Bay-dredged material, and develop a joint strategy to investigate and, as appropriate, implement such reuse.

2. **Delta Habitat Restoration Pilot Project.** As a part of its Ecosystem Restoration Program, CALFED should build on the apparent success of the Delta levee demonstration projects by designing and implementing a pilot project to investigate salinity-control strategies and other related issues.

3. **CALFED Ecosystem Restoration Program.** The Ecosystem Restoration Program effort should be revised to fund an investigation into the habitat restoration opportunities presented by Delta reuse of Bay material. CALFED restoration goals should be revised for the central and western Delta, and a recommendation regarding the acceptability of significant Delta reuse in the final Ecosystem Restoration Program Plan should be developed.

4. **CALFED Levee Program.** CALFED's Levee Program should be revised to include a careful review of the results of Delta demonstration projects using Bay materials. An investigation of additional issues raised by Delta reuse should be undertaken, and a conclusion reached regarding the acceptability of significant Delta reuse as a part of the levee plan.

5. **Regional Water Quality Control Board Resources.** Because both CALFED and LTMS are rapidly moving toward major decisions, they should investigate whether the Regional Board has adequate staff and other resources to study and resolve salinity and other water-quality issues raised by Delta reuse of Bay material. If required, additional resources should be provided immediately.

6. **Ocean Disposal.** LTMS agencies should consider the potential benefits of Delta reuse and potential demand for material in the Delta and evaluate the wisdom of the LTMS decision that 40 percent of Bay dredged material may be disposed at the deep-ocean disposal site.

7. **Large-Scale Delta Reuse.** Once a Delta habitat restoration demonstration project is undertaken, CALFED and LTMS should fully evaluate the feasibility and design of a large-scale Delta reuse project.

Sonoma Baylands: A Model Habitat Reuse Project

In the late 1800s a productive marshland located at the upper reaches of San Pablo Bay was diked and drained to create hay fields. This marshland was just one of many wetland areas to be transformed during the last one hundred and fifty years. Today nearly 90 percent of the San Francisco Bay's historic tidal marshes have been diked and drained for agriculture or filled for urban development.

One hundred years after this transformation from tidal marshland to hay field, the Bay Area has continued to change in many ways. In the 1980s, Port of Oakland officials proposed deepening its channels to accommodate larger ships. Originally, the U.S. Army Corps of Engineers expected to dredge the channels and dispose of the material in the Bay near Alcatraz Island or in the ocean, near Half Moon Bay. However, by 1988 both these solutions elicited fierce opposition from commercial and sport fishermen, environmentalists, and even Bay swimmers, who feared that water quality—crucial to a healthy ecosystem—would be adversely affected. Potential litigation threatened to halt dredging activities for years; the crisis seemed intractable. Meanwhile, environmentalists were seeking ways to protect sensitive lands in the rapidly urbanizing Bay Area. A 322-acre hay field on the edge of San Pablo Bay was a potential restoration site, but over the years it had subsided well below tidal-marsh elevations. A successful restoration would require an accumulation of up to seven and a half feet of "clean" mud before a new marsh could form. Left to natural sedimentation processes, this could take 50 years or more.

Figure 1. Sonoma Baylands Arial Photograph *Laurel Marcus*

The Port argued that dredging was needed immediately if it were to retain its share of the maritime market, generating revenues of more than $5 billion for the regional economy. The rapidly disappearing fringes of open land along the Bay's margins also needed to be preserved and restored for the benefit of both wildlife and future generations. To advance both these important objectives, a diverse and creative coalition with a new vision for the Bay was needed. Fortunately, that's exactly what happened. Environmentalists, fishermen, and the California Coastal Conservancy helped to convince the Port of Oakland, legislative leaders, and state and federal regulatory agencies of the potential joint benefits of a habitat-reuse project. The resulting Sonoma Baylands project combining tidal marsh restoration, seasonal wetland preservation, and an industrial-port dredging project-has been widely cited as a model for sustainable development and has opened the door to similar efforts nationwide. In the Bay Area, it has laid the groundwork for potential projects such as the Hamilton Field project. The Sonoma Baylands project has also helped to energize a larger movement to restore tens of thousands of acres of habitat around San Francisco Bay.

As you read this report, keep in mind our past challenges and successes. Today we are faced with another opportunity and challenge as we consider the need for Delta levee maintenance and habitat restoration and for disposal sites for material dredged from the Bay. Once again it will be critical for people with different ideas to and work together to find solutions to regional economic and environmental concerns. Dredged materials and water-quality issues are again on center stage. The ability to develop creative strategies to solve big problems is a hallmark of the Sonoma Baylands experience. It is worthwhile to recall how disparate members of the Bay Area community learned to work together to solve a Bay commercial problem while creating an innovative wetlands restoration project.

We need to change not only the way we address the Bay's complex restoration needs—no small task as we face unprecedented growth projections well into the next decade-but also the ways in which we work together to solve our mutual problems. It took a powerful and diverse collaboration built on cooperation and trust to accomplish the Sonoma Baylands project. This project has demonstrated that we can work together to solve significant local issues and that we do not have to choose between a healthy Bay and a healthy economy.

Introduction

LTMS and CALFED Background

The Long-Term Management Strategy (LTMS) and the CALFED Bay-Delta Program are both ambitious, long-term, state-federal planning efforts endeavoring to reduce the impact of human activities on the Bay-Delta Estuary. The LTMS is focused on dredging issues in the lower reaches of the Estuary. CALFED is engaged in a broader effort focused on ecosystem restoration, water quality, system vulnerability to natural disasters, and water-supply reliability.

Both these efforts address problems related to Bay dredged material. The LTMS is working to develop alternatives to in-Bay disposal of dredged material. Some of these alternative disposal strategies would promote the beneficial reuse of what has been considered merely waste material. The CALFED effort, on the other hand, is developing a Long-Term Levee Protection Plan and an Ecosystem Restoration Program, both of which may require substantial amounts of dredged material for full implementation to be possible. In part, CALFED is seeking in-fill material, and the LTMS is seeking a new home for unwanted dredged material. The juxtaposition of these two needs suggests the possibility of a LTMS/CALFED partnership that would investigate the potential benefits of reusing in the Delta clean material dredged lower in the Estuary.

Project Overview

This document, prepared for the Coastal Conservancy's Dredged Material Reuse Program and for submission to the CALFED Program, is the second phase of an effort to evaluate the potential for Delta reuse of clean dredged material from San Francisco Bay.

The first phase of this effort consisted of potential strategies to address concerns about the salinity of material dredged from the Bay. One of the primary obstacles to reusing this material in the Delta is the presence of salt in material dredged in the lower reaches of the Estuary. Importing substantial amounts of salt, along with Bay sediment, into the Delta could degrade water quality. This is a particular concern during dry years and periods when salinity can become a significant constraint on Delta agriculture, water-project exports, and environmental and fisheries protection.

Although there are many potential obstacles to such Delta reuse, such as cost, financing, engineering, air quality, and so forth, salinity has emerged as perhaps the most fundamental concern. In fact, concerns about salinity have prevented reusing Bay material in the Delta from being fully evaluated in either the LTMS or CALFED programs.

...CALFED is seeking sediment, and the LTMS is seeking a new home for unwanted sediment. The juxtaposition of these two needs suggests the possibility of a LTMS/CALFED partnership...

The narrow purpose of the first-phase document was to complete a reconnaissance-level effort to determine if there are any strategies worthy of further investigation with the potential to resolve these concerns about salinity. That effort concluded that there is a wide range of potential salinity-control strategies and that further investigation is indeed warranted.

This document updates the information in the first-phase document, addresses a broad range of issues related to potential Delta reuse, and identifies key issues that must be investigated to reach a final conclusion regarding the technical and economic feasibility of Delta reuse. A particular emphasis is the preparation of a conceptual design for a Delta reuse project. Phase three of this effort will involve increased work with stakeholders and decision makers to publicize the results of this work and to obtain support, for action recommendations and for further investigation.

The LTMS and the Department of Water Resources have focused more on opportunities for the Delta reuse of Bay material in levee maintenance than they have on habitat restoration. Therefore, although this document addresses both issues, it places greater

emphasis on the latter. The Department of Water Resources' extensive work program regarding Delta reuse is discussed in section IV.

The Dredged Material Reuse Program (DMRP)

The DMRP was established through the LTMS as a forum to facilitate the development of alternative upland disposal and reuse sites for clean dredged materials as well as for materials unsuitable for aquatic disposal. This collaborative effort includes:

The Bay Planning Coalition
The California Coastal Conservancy
California Environmental Trust
The Port of Oakland
The San Francisco Bay Conservation and Development Commission
Save The Bay
U. S. Environmental Protection Agency
U. S. Army Corps of Engineers

II. Dredging and the Long-Term Management Strategy

According to the LTMS Preferred Alternative, two hundred million cubic yards of clean dredged material could be available for reuse during the coming fifty years.

Overview of Dredging in the San Francisco Bay

Each year, more than 4,000 commercial ocean-going vessels pass through the Estuary, carrying more than 50 million tons of cargo to and from ports and harbors stretching from Redwood City to Sacramento. The Estuary is home to more than 1,000 commercial fishing vessels and hosts more than thirty-three thousand recreational boats in more than 200 marinas. The Estuary has also been an important center for naval and other military operations.

To maintain these activities in an estuary with depths averaging less than twenty feet requires extensive dredging. Ocean-going, commercial, deep-draft vessels can draw 40 feet or more. Historically, dredging volumes in the Bay have ranged from two to ten million cubic yards (mcy) annually. However, the recent reduction of military activity in the Estuary has decreased the amount of dredging performed annually.

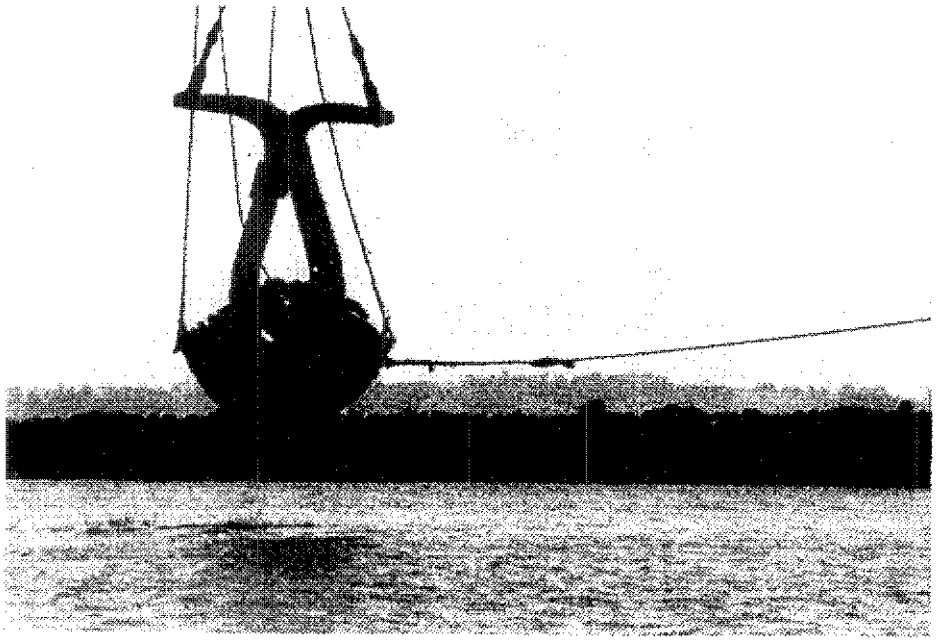

Figure 2. Dredging

The LTMS estimates that from 173.5 million to 296.5 mcy of material will be dredged from the Bay over the next 50 years.[1] These estimates do not include the current proposal for expanding the San Francisco International Airport. This proposed project alone could add many millions of cubic yards of dredged material to prepare the site for construction fill.

Generally, the reuse of Bay sediments is constrained by soil type and chemical concentration. The degree of potential contamination in Bay sediments varies dramatically depending on several factors: soil type, sediment depth, proximity to sources of contamination, and hydrology. A conservative estimate of total material available for beneficial Delta reuse should be based on the assumption that, due to a variety of possible concerns, reuse in the Delta would be limited to material that is suitable for unconfined aquatic disposal (or SUAD, in LTMS speak). For convenience, this report simply refers to SUAD material as "clean."

The LTMS estimates that a minimum of 80 percent of Bay-dredged material is suitable for aquatic disposal.[2] Assuming the elimination of all non-SUAD materials, the amount of material potentially available for reuse over the LTMS planning horizon ranges from 138.8 to 237.2 mcy.

The LTMS Preferred Alternative

The LTMS final EIS/EIR and the final LTMS ROD call for 40 percent of all material dredged from the

Bay to be reused at upland and wetland sites. The FEIS/EIR document considers a reuse range from 0 to 189 mcy in the next fifty years. The preferred alternative calls for 83 to 118.5 mcy of reuse during this period.[3] The LTMS EIS/EIR indicates that this material will be allocated to three categories of sites: wetland restoration, Delta levee restoration, and rehandling. In addition to the Delta levee restoration category, the wetland restoration and rehandling categories also include reuse in the Delta. The LTMS EIS/EIR Delta levee restoration estimates alone call for from twenty-one to twenty-six mcy of material to be reused in the Delta in the next 50 years.[4] DWR estimates that up to 200 mcy may be required, including levee maintenance, habitat creation, and subsidence reversal.[5] In addition, in-Bay sites alone are unlikely to provide adequate capacity to meet LTMS wetland reuse goals.

In addition to the material targeted for reuse in the LTMS preferred alternative, the preferred alternative indicates that 40 percent of dredged material over the next fifty years, or 83 to 118.5 mcy of material, will be disposed of at the deep-ocean disposal site. If it were determined that it is preferable to reuse this material, all of it could be used for that purpose. Unlike the conceptual design in this document, ocean disposal does not offer any potential benefits to fish, wildlife, or water quality. Therefore, even without eliminating the amount of in-Bay disposal contained in the LTMS preferred alternative (and it is Save The Bay's long-term goal to eliminate in-Bay disposal), the LTMS preferred alternative indicates that more than 200 mcy could be available for reuse during the coming 50 years.

... From 173.5 million to 296.5 mcy of sediment will be dredged in the Bay over the next 50 years...Without the ability to reuse Bay-dredged material in the Delta, it is very unlikely that the LTMS will be able to achieve the reuse goals in its preferred alternative.

Conclusion

Without the ability to reuse Bay-dredged material in the Delta, it is very unlikely that the LTMS will be able to achieve the reuse goals in its preferred alternative. In addition, much, if not all, of the material targeted for ocean disposal by the LTMS could be available for reuse projects.

47. LTMS report, Appendix A: General Engineering Considerations, p. A-9.
48. LTMS FEIS/R, pp. 3-69.
49. LTMS report, Appendix A: General Engineering Considerations, p. A-8.
50. Ecosystem Restoration Program Plan PEIS/R, p. 1
51. Delta Estuary, California's Inland Coast, p. 85
52. Initial Study and Negative Declaration for Proposed Sherman Island, Wildlife Management Plan, p. 19. Delta Atlas website.
53. Delta Estuary, California's Inland Coast, p. 82
54. Delta Estuary, California's Inland Coast, p. 82
55. Delta Estuary, California's Inland Coast, p. 84
56. Ibid., p. A-17.
57. LTMS Reuse/Upland Site Analysis, Appendix A, p. A-18
58. Ogden Beeman & Associates, Inc. October 1990
59. Appendix A, LTMS Report, p. A-4
60. Appendix A, LTMS Report, p. A-9
61. Curt Schmutte, personal communication
62. Sam Luoma, personal communication
63. LTMS Reuse/Upland Site Analysis, Appendix A, p. A-20.
64. Ibid., p. A-10
65. Ibid., p. A-9
66. Delta Atlas, p. 26
67. Ibid., p. A-17
68. Appendix A, LTMS Report, p. A-9
69. Negative Declaration for the Sherman Island Wildlife Management plan, pp. 15-19.
70. Designated site disposal costs are from the LTMS Dredging and Disposal Road Map, 1999.
71. LTMS Dredging and Disposal Road Map, 1999
72. Communication with Len Cordoza. This cost includes the $6-$9 per cy tipping fee.
73. Includes off-loading costs.
74. From 1600 cy levee restoration project conducted in 1990.
75. From 70,000 cy levee restoration project conducted in 1994. Does not include engineering/construction and monitoring costs.
76. From 75,000 cy levee restoration project conducted in 1992. The material was taken from Simmons Island.
77. Manson Construction and Engineering Company letter to Department of the Army, San Francisco Dist., Corps of Engineers, 1990.
78. Bill Heyenbruch, personal communication.
79. Implementation costs listed are for site preparation and are additive to the disposal costs.
80. Implementation and disposal costs for non-Delta projects are from LTMS Dredging and Disposal Road Map, 1999, unless otherwise noted.
81. Restore America's Estuaries. Funding for Habitat Restoration Projects: A Citizens Guide, 1998.
82. The U.S. Arm Corps of Engineers has not completed the cost analysis as of the date of this report.
83. Hamilton Army Airfield Wetland Restoration Feasibility Study, pp. 5-88.